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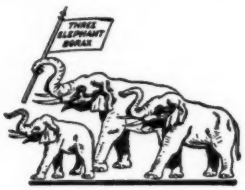

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R. H. STINCHFIELD, *Editor*

Editorial Office: 1155 16th Street, N. W., Washington 6, D. C.

VOLUME XXX NO. 1

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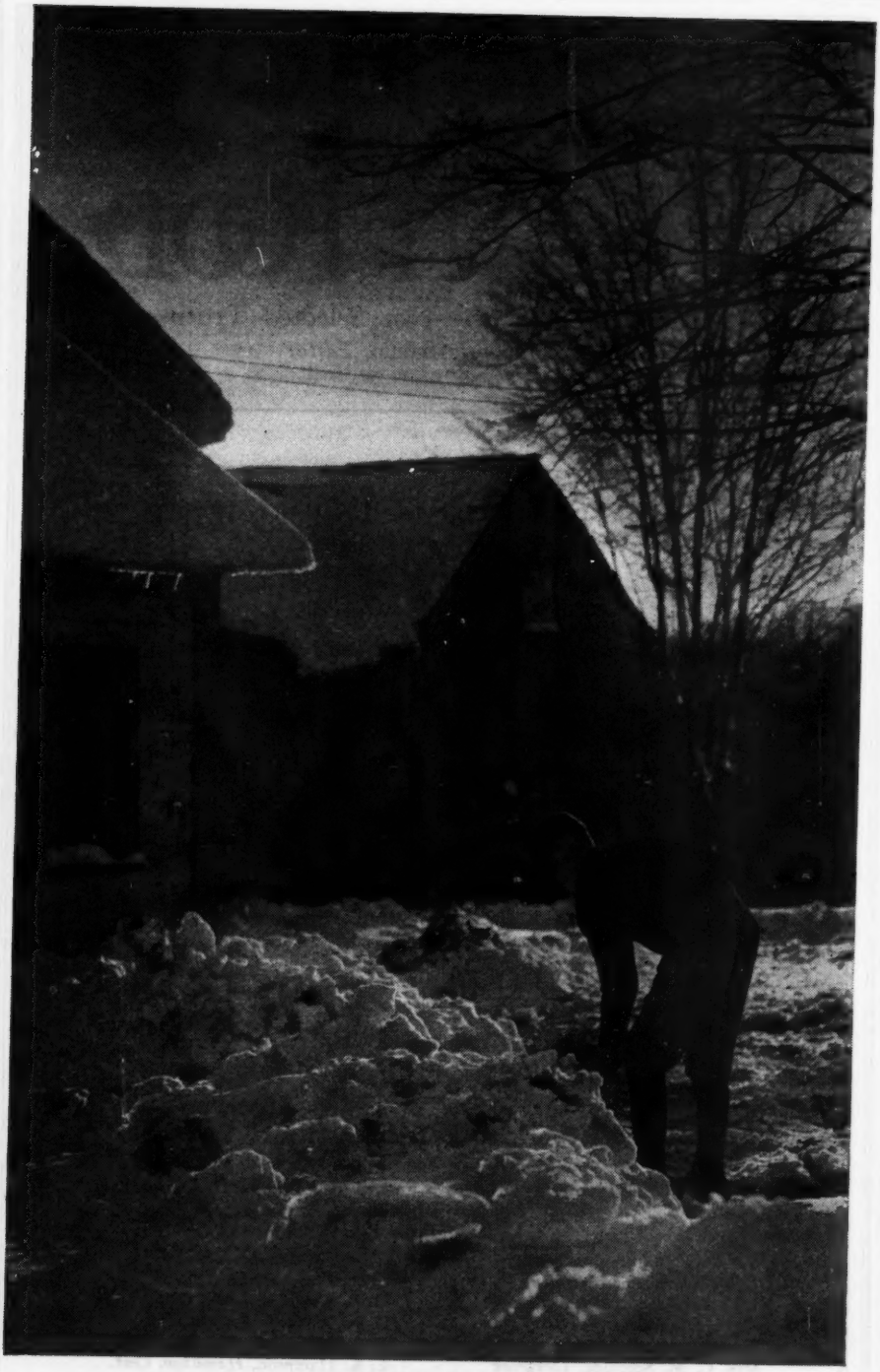

HOME ATHLETICS!

Better Crops with PLANT FOOD

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VOL. XXX WASHINGTON, D. C., JANUARY, 1946 No. 1

The Challenge of . . .

TOMORROW

Jeff McDermid

SOME folks have cut out making New Years Resolutions for Tomorrow, such obvious ones as not to kick the cat or be mean to mother-in-law. Upon diligent research I have found their underlying reason for resolving not to resolve anymore. They believe that the age of individualism is "kaput" and the era of the ego is the worst casualty of the war. Of what avail, they ask, is one guy's wishful thinking?

In plain street corner conversation, their hunch is that the influence of personal idealism and the example of lofty single aspirations no longer count on the score-board. Their attitude is like that of a forlorn prairie pioneer who sees a cyclone cloud forming to the windward and who has neither the power to shift its course nor a convenient storm-cellar in which to seek imperfect shelter. So he says, "I might as well finish this furrow and then be gone with the wind!"

Too much perplexing complexity, too many special privilege pressure groups, and a surplus of smart scientists—that's the answer often given for the cringing state of mind which governs them; although the ones having extreme cases of this mental turbulence mention untrustworthy foreign relations and the alleged callous indifference of our age to crimes of cruelty and viciousness.

To be sure, our holiday season went along on schedule nonetheless, minus a few customary festive things and without numerous friendly faces we were wont to associate always with the

spirit of those pleasant reunions. Amid the turmoil of shopping, ministers of grace sensed the need for greater confidence and searched the scriptures for the vitamins required to fill the strange void which victory left in our queasy spiritual stomachs.

Taking up the first and foremost complaint that causes folks to mistrust the future, we have to admit on the face of it that you and I have emerged gradually and almost imperceptibly from a simple community life to a bewildering age of fantastic technical complexity. This same thing was said to me in the early 1900's by a garrulous old uncle (and endorsed by my father). He could span the years from the tallow dip and the ox team to the carbon filament lamp and the automobile, and he could remember when a hoot and a holler was the only mode of distant rural communication. He loved to brag about his former deprivations amid his current comforts, and to allege that we of the modern era would be helpless if thrust back again to the backwoods.

Nevertheless and notwithstanding those pronouncements by my worthy relations, I am not shaken from the belief that the period of my life has developed the most marvels of any 50-odd years in the progress of the cosmos. This is so because of ideas and discoveries made in realms previously assigned to higher nature or to the supernatural; because of imagination, confidence, skill, patience, devotion, and faith—all truly noble attributes which for the most part helped and healed mankind as our race had not been helped and healed in countless centuries before.

What we are so sorely bothered about in these days of dilemma are the motives and the directing forces with which our brilliant science (often trained at public expense) will proceed. Will our wonder-workers go on beyond the horizon to do more new things almost as miraculous, and we trust as gracious, as those done so long ago in Galilee?

WILL economic planning, the handmaiden of practical science, broaden out and blossom forth with a better concept of the good goal than solely one of profit and compound interest? It's all in the adaptation of science, whether its discoveries be of benefit or the reverse. Maybe if we had more real scientists in charge of the counting house, the final fruit would be riper and sounder.

Take our younger generation seeking what seems remote and unattainable—a cozy home for themselves. Surrounded by the greatest array of comfort-catering gadgets and modish designs for healthful living ever blueprinted, they are up against out-of-date financing, unreasonable labor demands and squeezes, and the crazy circumlocutions of the construction industry. Their grand-dads of a simpler time got a roof over their heads by their own efforts or by letting the whole job to one self-reliant contractor, free of pressure rackets and profit-taking subcontractors. Finally when the shelter was done it was a sturdy and strong dwelling, and not a jerry-built contraption worthy only of a place in the prop-room of a theater.

WILL the inexcusable conditions of which the housing situation serves as an example spur our powerful young veterans' alliances to seek common-sense correctives for all post-war privilege and abuse of social obligations? Or will they accept them as necessary evils, not willing to fight on the home front as manfully as they did abroad? Personally I put my bets on reform, although it may seem slow in coming, like some of our other pledges of democracy.

Is the individual put at a discount when such reforms are sought? Must the fact that forces and movements are on such a terrifying scale discourage anybody from "crusading at the crossroads?" Must we sit back and let the steam roller of the times run over us without a peep? Is the chap who writes the "vox pop" in the news-

papers just a voice crying in the desert?

Well, when a fellow has a dream he experiences it alone. Sometimes others have similar dreams, but they come individually anyhow, never in the mass. Almost any new scientific wonder or any germ idea for social or medical betterment happens first to a single mind, like a spark to light the mental darkness. One or two persons grasp such a hunch and give it a test in secret, whisper its possible significance, and try to prove it gradually. You stand by yourself as a renaissance, if you please.

Somehow it seems to me that we can't escape having our hopes pinned on what some individual will imagine or dream, or overlook the individual courage and daring it takes to foster such new ideas until they become accepted in the face of indifference or hostility.

You can test that theory against all the technical marvels which have been developed since 1941, some of them born in the urge to destroy enemies or defend us from them. Not one of them could have materialized without the genius, skill, and imagination of individual workers. You can't hatch such programs by an automatic machine or expect the masses to create them by wishful thinking in concert. However, this concerted desire and mass requirement always give some individual an itch to see what may be done about it.

So the only kind of individual who is out of luck these days is the chap who has no imagination, no training, no skill, and no zest for creating. For those who continue their education, who have faith in the future without fear, and who believe they are put here for something besides consuming and being "guaranteed" everything by a munificent government—for such there is a bigger field for personal achievement than the world has ever known.

And yet this is not all. We must question individual achievement which has cheap, unworthy, and selfish motives. We have a right to expect the best of those who have the privilege of pursuing individual inclinations in a land of liberty. We have every reason to hope that the veterans now enrolled in collegiate courses suited to their desires will make as much use of education as they did of military training to stamp out abuses and set up needful reforms.

I THINK this has been more than splendidly upheld by Col. Charles Lindbergh who in a recent return to the platform insisted upon Christian motives in governing a new world order.

In concluding his talk, Col. Lindbergh said: "We in America already have the most powerful air force, the greatest Navy, and the best equipped Army. We have demonstrated that we can outbuild any other nation. We have the atomic bomb. We are a Christian people. The ideals we profess are high. We have all the necessary elements to lead the world through this period of crisis. But can we combine these elements in our daily policies and lives? Whether our western civilization is facing new heights of human accomplishment or whether it is doomed to extinction depends not so much on technical progress as on the answer we make to this question."

One may sum up the case by saying that decent behavior among the power-wielding nations will come either because they really want to be good or because they are afraid not to be. To follow the first is to act positively,

(*Turn to page* 50)

A group of agriculturists inspects a field of wild winter peas in Holmes County, Mississippi.

A New Legume for the South
Wild Winter Peas

By A. D. Suttle

Mississippi State College, State College, Mississippi

THE wild winter pea (Lathyrus hirsuta) also known in Louisiana as Singletary pea and in Georgia and Alabama as Caley pea, is one of the annual legumes which matures seed at oat harvesting time. This pea matures seed a little earlier than vetch and is much more prolific, frequently producing 1,000 pounds of seed to the acre. Records show a production of 10,367 pounds of green manure to the acre in Louisiana.

This pea was collected and placed in the plant collection of the Botany Department at Mississippi State College in 1891 by Dr. S. M. Tracy, at that time Director of the Mississippi Experiment Station. It was first noticed as a promising crop by J. N. Lipscomb, then Dean of the School of Agriculture, and the writer in 1926, on that portion of the college farm known as the Maxwell Bottom. The peas produced such an abundance of green foliage with a thin stand that year that we estimated it at above three tons of green material to the acre. Ten years later, 1936, the pea was unusually outstanding in a Johnson grass meadow on a place adjoining the college property. So thick was the pea on this meadow that it created trouble in harvesting the hay. Out of this hay H. W. Bennett, Associate Agronomist of the Mississippi Experiment Station, obtained the seeds he has been using in his research with this crop.

About 1936, the Moss Tie Company,

Columbus, Mississippi, recognized the value of the wild winter pea both as a grazing and as a green manure crop. It is the writer's impression that the Moss Tie Company was the first firm to market this seed.

The purpose of this article is not to maintain that the wild winter pea is a better green manure crop than vetch or Austrian winter peas. Both will out-yield the wild winter pea in tons of green manure from a given acre. Probably the wild winter pea would not have a place in our farming if farmers had a source of cheap seed of vetch and Austrian winter peas. However, with the scarcity of vetch and the high price of Austrian winter pea seed, the wild winter pea occupies an important place as a green manure crop in the Southern states.

The abundance of cheap seed in connection with fair yields of green manure makes the wild pea important as a green manure crop. It rarely, under favorable conditions, yields less than 500 pounds and has been known to produce the stupendous yield of 1,600 pounds of seed to the acre. Vetch, as a rule, will not produce in excess of 300 pounds of seed to the acre. At times Austrian winter peas make a good yield of seed in the South, yet records show that their failures exceed their successes. The wild winter pea, it is apparent, will produce from three to five times as much seed as vetch or Austrian winter peas.

The seed of wild winter peas may be distinguished from the hairy vetch by the black color of the vetch seed which have a smooth surface and are sometimes marbled with brown. The seed of the wild winter pea has a rough seed surface and is brownish gray. The seed of the two plants are about the same size. Austrian winter pea seed are gray mottled with purple and are about four times the size of vetch and wild winter pea seed.

Wild winter peas may be planted for three purposes: (1) green manure crop, (2) seed crop, and (3) grazing crop. Since the plants of the wild winter pea do not attain quite as much growth as vetch, a few more seed should be planted to the acre. Probably 40 pounds of wild winter peas are the most desirable amount of seed

Stacking and threshing from the stack is probably the cheapest and safest way to save wild winter pea seed.

to plant, whereas 30 pounds of vetch and 40 pounds of Austrian winter peas give most nearly a desired stand. When planted for a green manure crop, the simplest and probably the most desirable method is to sow broadcast three rows at a time. This should be followed by a middle breaker in the middle of the row, covering the seeds well and at the same time leaving the land in rows to afford thorough drainage. Sown in this manner, a larger early crop of green manure will be obtained. Thorough drainage enables the plants to grow faster.

When sown for a seed crop, breaking the land and drilling or broadcasting the seed as in the case of oats are desirable. The ground should be well smoothed to enable the combine to do a clean job of harvesting. During exceptionally dry spring seasons, the peas may not make enough growth and it will be necessary to run the blade of the combine close to the ground in order to save all of them.

When sown for grazing, wild winter peas should usually be planted on meadows or pasture sod with only light disking or with no preparation of the seed bed. The peas seem to be relatively palatable and are able to withstand, without injury, a large amount of heavy grazing. The wild winter pea is much better adapted to grazing and furnishes nutrients in a more palatable form than either vetch or Austrian winter peas.

Date of Seeding

The most desirable time for sowing wild winter peas is with the first rains in September. They may be sown with fair results until the first of November. Sowing early for green manuring is more desirable since the wild pea is later than vetch in making its full growth in the spring. Early sowing in the fall increases spring growth to unusual proportions. Early fall sowing more nearly approaches conditions of the pea in its wild state than late fall sowing.

Scarification

Generally speaking, about one-half or two-thirds of the wild winter pea seeds, when harvested, may be termed hard seed. They will not germinate for a rather long period. As a result, the seeds are usually scarified before planting. Having 35 or 40 per cent of hard seed after scarification is not unusual. The seeds come up rather quickly, however, when planted under favorable conditions. Thirty pounds of scarified seed to the acre gave a perfect stand in 1942. If conditions are exceptionally favorable, the greater portion of the hard seed will germinate almost as soon as those which are not hard. Scarifying the seed is generally considered good farm practice. Good stands may be obtained by planting 40 pounds of unscarified seed to the acre, if the facilities for scarification are not available.

Inoculation

Inoculation is just as essential for the wild pea as for vetch, Austrian winter peas, or any other legume, the same inoculating material being used. Inoculation is unnecessary, however, if the land that produces the seed is to be sown again in wild winter peas. Inoculating either vetch, Austrian winter peas, or wild winter peas is unnecessary on most black land farms where the three grow wild on practically the entire area. Certainly, inoculation is cheap insurance against crop failure.

Fertilizing

Few data are available on fertilizing wild winter peas. Obviously phosphorus and potash are the only elements necessary, since the crop receives the greater portion of its nitrogen from the air. A good practice is to apply 200-400 pounds of superphosphate and 50-100 pounds of muirate of potash to the acre before the peas are planted. Yield data from eight field tests obtained in an organized demonstration program con-

(*Turn to page* 48)

Nitrogen (60 lbs. of ammonium nitrate per acre) applied as a top-dressing in addition to 0-20-20 at 250 lbs. per acre made possible an increase of 41 bushels of oats per acre on the farm of Ivar Karri, Hurley, Wisconsin.

Crop Production Horizons

By C. J. Chapman

Soils Department, College of Agriculture, Madison, Wisconsin

POWERFUL and tremendous forces are at work today and may result in widespread changes in the political as well the social outlook of millions of people in the world of tomorrow. The resources of the whole world were thrown into a gigantic war which on the active battle fronts of Europe, Asia, and the south and east Pacific has destroyed physical and cultural achievements gained throughout generations of human progress.

The aggressor nations have exhausted themselves and drained heavily upon the resources of the rest of the world. Cities and countrysides have been reduced to rubble and waste. But the world is now turning its energies toward peacetime pursuits in the reconstruction of its cities, the rehabilitation of its agriculture, and the re-establishment of law and order. Now the chief concern of hundreds of millions of people is food, clothing, shelter, and a desire for some of the comforts and even luxuries which this modern age of science and invention should and can provide.

It is fortunate that long before we became involved in World War II, this nation had been engaged in a program concerned with the conservation of its great natural resources. Men had been considering very seriously this matter of our national well-being, not so much in terms of the immediate welfare of its citizens, but in terms of their future.

Our Greatest Resource—The Soil

For nearly 30 years I have been traveling the State of Wisconsin and in my extension activities have tried to arouse farmers to an appreciation

The residual effect of 0-20-10 (225 lbs. per acre) applied at the time of seeding, 1944, resulted in a difference of 3,849 lbs. green weight per acre in the growth of clover hay in 1945 on the farm of Duane Thomas, Darlington, Wisconsin, although the soils on this farm had been maintained in a state of average fertility through manure applied every four or five years.

of the seriousness of soil fertility waste. In the early days I was looked upon with pity and disdain by many of my fellow colleagues. But now with the combined results of the findings of our agricultural experiment stations together with the help of county agents, extension workers, and teachers of vocational agriculture in carrying out thousands of demonstrations and experiments we have built up a vast fund of information and evidence that has put aside any doubt as to the seriousness and the need for a program of soil conservation. We have proven without question the value and economy of using commercial fertilizers in Wisconsin. And it is fitting right here that we give recognition to the early and continued efforts and influence of the late Professor A. R. Whitson, former Chairman of the Soils Department of the University of Wisconsin. Professor Whitson for more than 40 years was one of the country's outstanding leaders and educators in the field of soil conservation.

During the past 30 years I have seen many changes in the attitude of the general public toward the use of commercial fertilizers. Programs in Wisconsin along the lines of soil conservation carried out through federal and state agencies are blazing the story of soil fertility in the headlines as well as in farm practice. Tonnage reports for Wisconsin during 1945 indicate the largest use of commercial fertilizers in all history. It is estimated that in 1945 better than 250,000 tons of commercial plant foods were purchased and applied on Wisconsin farms. Thirty years ago (1915), records show that Wisconsin farmers used only 3,000 tons. During the past 10 years the tonnage has increased by leaps and bounds. (A total of 28,414 tons were sold in 1935.)

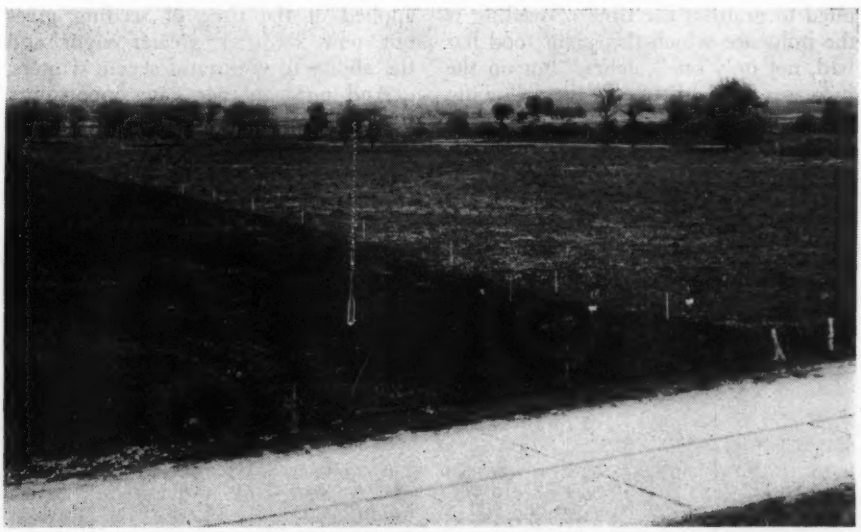
We have made great strides in our program for liming the soils of the State. In the past 11 years a total of nearly 12 million tons of liming materials have been applied on Wisconsin's acid farm lands. Crop reports this past year show that Wisconsin produced the second largest crop of tame hay in all history. Clover again flourishes on Wisconsin farms. The average yields of grain and corn have

increased a good 30 per cent in the past few years. It is true that our increased yields of corn are due in part to the more extensive plantings of hybrids and in the case of oats to the almost complete shift to our new high-yielding, rust- and smut-resistant Vicland variety. Yet the increased tonnage of lime and fertilizers has played an important role in attaining these higher average yields.

And so I do feel that our educational efforts have been fruitful. I am confident that even though our job in Wisconsin is far from finished, with the support that has been given through the help of thousands of agricultural leaders working with us through associated educational agencies, our program will go forward with increased momentum.

This past year in Wisconsin we again conducted a total of more than 400 fertilizer demonstrations. These demonstrations were supervised by some 50 county agricultural agents and in many counties the Smith-Hughes teachers of vocational agriculture assisted with the work. The fertilizer industry through the Middle West Soil Improvement Association and the American Potash Institute furnished most of the commercial fertilizer for these demonstrations on pasture, hay, corn, small grain, and legume seedings. Substantial contributions were made by the Tennessee Valley Authority in supplying phosphate for whole farm demonstrations in 28 Wisconsin counties. The sum total of all combined agencies and effort has given us a record year for demonstrations which show more convincingly than ever that Wisconsin soils will respond profitably to fertilizer treatment.

Evidence revealed in our district and state soil-testing laboratories and backed up by actual field demonstrations points to the need of more potash in addition to phosphate on our Wisconsin soils. For many years we have recognized the need for potash on our sandy and low black bottom soils. But we have been amazed to find that a vast area (some 5,000 square miles) of heavy silt loam soil in north-central Wisconsin (known as Colby or Spencer silt loam) is showing a marked response to potash. Even



Nitrogen fertilizer (ammonium nitrate at 175 lbs. per acre) applied to permanent June grass pasture on the Wells Himsel farm at Paoli, Wisconsin, produced earlier and more abundant grazing and an increase of 3,200 lbs. of green weight per acre.

This photo shows the typical response of timothy to treatment with nitrogen fertilizer. Here on the Wm. Zielke farm at Gliddon, Wisconsin, the yield was increased from 1,500 to 3,750 pounds per acre—not only 2,250 pounds more hay per acre, but a leafier and more palatable feed. Ammonium nitrate was applied as a top-dressing at rate of 200 lbs. per acre on April 12, 1945.

the silt and clay loam soils of southern, western, and eastern Wisconsin have shown a profitable response to potash in better than 60 per cent of the demonstrations conducted this past year.

By far the greatest and most important effect of the use of fertilizers applied to grain at the time of seeding is the influence which this plant food has had, not only on "catches," but on the increases in yields of hay the following year. The average of 138 field demonstrations (see Table 1) carried out during the past 13 years where residual benefits to the hay crop have been measured shows that yields of this crop have been greatly increased. In fact, we note that the relative response to potash on the hay crop is greater than shown the first year on the grain. (See Table 2.) Fertilizer applied at the time of seeding gives our new seedings greater vigor and the ability to withstand severe winters.

And now another new opportunity for increasing the productiveness of our permanent pastures and grassland hay meadows looms up on the horizon.

TABLE 1.—RESIDUAL CARRY-OVER BENEFIT OF HAY CROP (13 YEARS, INCLUDING 1945). SHOWING TOTAL VALUE OF HAY, GRAIN, AND STRAW, AND PROFIT OVER COST OF FERTILIZER (138 PLOTS).

Treatment	Rate per acre	Average yield grain	Value of increase grain & straw[1]	Average yield of hay	Pounds increase hay[2]	Value of inc. grain, straw and hay	Cost of fertilizer	Net profit per acre
0–20–0.....	200	52.3	$8.95	4749	1400	$19.45	$2.65	$16.80
0–20–10.....	200	56.0	10.79	5434	2085	26.43	3.75	22.68
Check.....	.....	41.5	.....	3349	.....	.....	.....	.....

[1] Oats and barley figured at average value of 65¢ per bushel; straw at $4.00 per ton.
[2] Hay figured at $15.00 per ton.

TABLE 2.—AVERAGE OF 550 GRAIN DEMONSTRATIONS (13 YEARS, INCLUDING 1945) WHERE THE YIELDS OF 0-20-0 AND 0-20-10 OR 0-20-20 ARE COMPARED

Treatment	Average rate per acre	Average yield	Increase yield	Average yield straw	Increase straw	Value of increase grain & straw [1]	Cost of fertilizer	Net profit per acre
0–20–0.....	200	53.04	10.38	2537	443	$7.63	$2.65	$4.98
0–20–10.....	200	57.16	14.50	2705	611	10.64	3.75	6.89
Check.....	.....	42.66	.....	2094	.....	.....	.....	.....

[1] Oats and barley figured at average value of 65¢ per bushel; straw at $4.00 per ton.

The number one limiting element in the growth of pasture grasses is nitrogen. Practically all of our permanent grassland pastures are suffering from a lack of this element. The best proof of this shortage of nitrogen in our permanent pastures can be seen in the spring where those dark green patches of rank growing grass are so much in evidence. These urine spots are good demonstrations of what nitrogen will do to increase the early growth of grasses. There are some five million acres of non-wooded permanent pasture in Wisconsin—a good three million of which would undoubtedly respond profitably to nitrogen fertilization.

Nitrogen Fertilizer for Permanent Pasture Proves Profitable

In the four demonstrations recorded below, the value of nitrogen fertilizer has been measured in terms of milk production. In these demonstrations, uniform pasture fields were divided into equal halves. One half of each was treated with a nitrogen fertilizer. Records were kept of the number of days the cows grazed on each half and also the pounds of milk produced on each area.

Demonstration Number 1

In this demonstration, carried out on the Nick Schmidt farm at Monroe

On the Potter Porter farm at Evansville, Wisconsin, 700 pounds of 8-8-8 applied on the plow-sole plus 125 pounds of 2-12-6 in the hill resulted in an increase of 33.7 bushels of corn per acre. No manure was available for this field. The yield on the plot receiving 2-12-6 only was 36.0 bushels per acre.

in 1933, a 16-acre creek bottom pasture field was selected. Calcium cyanamid (21 per cent nitrogen) was applied at the rate of 300 lbs. per acre on one half of the field (eight acres). The entire herd of 13 Brown Swiss milch cows together with 12 heifers and dry cows were turned into the fertilized portion on May 13. They were subsequently switched back and forth. Each area was grazed to approximately the same level each time. The experiment was terminated on September 1.

The results were as follows:

	Fertilized	*Unfertilized*
Number of pasture days for entire herd	71	38
Pounds of milk produced	35,500	19,000
Value of milk at $1 per cwt.	$355.00	$190.00
Value of pasture for 12 heifers and dry cows	$ 77.50	$ 41.50
Total value of pasture	$432.50	$231.50
Cost of fertilizer	$ 40.80	.....
Net returns from pasture	$391.70	$231.50
Difference in favor of fertilized pasture	$160.20	

Demonstration Number 2

A similar demonstration was carried out on the Karl Schumann farm at Mazomanie in 1938. In this case a four-acre tract of uniform creek bottom pasture was divided into two-acre paddocks. One half (two acres) was treated with ammonium sulphate (20 per cent nitrogen) at the rate of 200 lbs. per acre. Five of Mr. Schumann's Holstein cows were turned in on the fertilized area on May 11 and the same five cows were rotated back and forth until June 25 when the experiment was terminated.

The results were as follows:

Number of pasture days for five cows on unfertilized area	14
Number of pasture days for five cows on fertilized area	32
Pounds of milk from the fertilized area	5,611
Pounds of milk from the unfertilized area	2,658
Pounds of milk increase	2,953
Value of milk at $1 per cwt.	$29.53
Cost of 400 lbs. of ammonium sulphate	$ 8.00

Demonstration Number 3

In the spring of 1944, a demonstration was set up on the Wells Himsel farm at Paoli. A 23-acre creek bottom pasture was selected. It was divided in half with an electric fence. Ammonium nitrate (33 per cent nitrogen) was applied at the rate of 175 lbs. per acre. (Actually only eight acres were treated; the balance was wet and boggy.) The entire herd consisting of 14 milch cows, 5 heifers and dry cows, and the bull was turned into the fertilized half on May 20. They were subsequently rotated back and forth from fertilized to unfertilized until August 13 when the experiment was ended. (Results, top page 15.)

Demonstration Number 4

The demonstration described under No. 3, conducted on the Wells Himsel farm at Paoli, was repeated in 1945. Ammonium nitrate was applied on March 31 at 200 pounds per acre on the same half of pasture as in 1944. The entire herd (averaging 17 milch cows, one heifer, one to two dry cows, and the bull) was turned into the fertilized half on May 19. They were rotated back and forth from fertilized to unfertilized as in previous experiments for a period of four months and 26 days. (The experiment was terminated October 10.)

The fertilized half was ready for grazing a good week earlier than the

The results of demonstration No. 3:

Number of pasture days for entire herd on fertilized area	56
Number of pasture days for entire herd on unfertilized area	30
Pounds of milk from the fertilized half	18,934
Pounds of milk from the unfertilized half	10,269
Pounds of milk increase	8,665
Value of increase at $3.15 per cwt.	$272.94
Value of pasture for heifers, dry cows and bull (26 days)	$ 12.00
Total value of increased production due to fertilizer	$284.94
Cost of fertilizer	$ 36.00

unfertilized, and for the period May 19 to mid-July there was a tremendous difference in the amount of grass on the fertilized portion. One noticeable observation made during the July and August period was the great difference in weed infestation. The unfertilized portion became badly infested with White Top daisy. There were very few weeds in the fertilized half, due apparently to the early vigorous and rank growth of grass. There was a noticeable difference during the entire summer in the thickness of the turf—the fertilized half produced a matted sod whereas the unfertilized half was always thin and sparse.

Except for a period of 14 days (September 4 to 18) this 23-acre pasture furnished practically all of the feed for the whole herd (21 head) for the entire summer. (During the period September 4 to 18 the herd had access to a stubble field of new seeding clover as a supplement to the feed furnished from the fertilized half. During this 14-day period one-half of the milk production was credited to the extra feed furnished from the field of new seeding clover.) (Results, bottom of page.)

The results of the above four demonstrations indicate quite conclusively that nitrogen fertilizer can be used with profit on June grass permanent pasture which supports a good turf and where the water-holding capacity is good.

It must be pointed out, however, that the continuous use, year after year, of straight nitrogen fertilizer will eventually result in the depletion of the available reserves of lime, phosphate, and potash in the soil. It is therefore recommended that the mineral reserves of the soil be maintained through the application of lime, phosphate, and potash fertilizers. Larger increases from the use of nitrogen fertilizers can be expected on land that has been so treated.

There is still another place on many Wisconsin farms where nitrogen fertilizer may be used with profit. And

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Results of the 1945 demonstration:

Number of pasture days for entire herd on fertilized area	96
Number of pasture days for entire herd on unfertilized area	50
Pounds of milk produced while on fertilized half	31,479
Pounds of milk credited to new seeding clover (14 days) (½ of total production for period September 4–18)	1,580
Total net pounds of milk credited to fertilized pasture	29,899
Total pounds of milk produced while on unfertilized pasture	16,678
Pounds of milk increase resulting from fertilizer	13,221
Value of milk at $3.25 per cwt. credited to fertilizer treatment	$429.68
Value of pasture for heifers, dry cows, and bull (46 days)	$ 15.00
Total value of increased production due to fertilizer	$444.68
Cost of ammonium nitrate used on fertilized half	$ 48.00

The Fertilizer Rate Problem

By R. E. Stephenson

Soils Department, Agricultural Experiment Station, Corvallis, Oregon

A FARMER reported 100 pounds of sulfate of ammonia used on onions; another reported 100 pounds of sodium nitrate used on mint. In neither case was there any appreciable response, and crop growth was entirely unsatisfactory—so much so that assistance was sought to diagnose the trouble and explain the unsatisfactory growth and harvest.

In both cases, whatever if anything else may have been wrong, the fertilizer program was inadequate. In both cases a complete fertilizer should have been used, and a sulfur carrier should have been included for the particular area. Considering nitrogen alone, the 20 pounds supplied the onions could not contribute a very great increase in growth. A 300-bushel yield would have 40 pounds of nitrogen in the bulbs and at least that much in the tops. Crops seldom recover more than 75 per cent of the nitrogen supplied in the fertilizer, and a 50 per cent recovery is reasonable. A 10- to 15-pound nitrogen recovery where 80 or more is needed could not be expected to cause much increase in yield. The mint crop was still more inadequately fertilized.

These are isolated cases but are typical of much fertilizer practice. The reason probably is lack of knowledge of plant requirements and perhaps partly lack of well-established faith in commercial fertilizers. In some cases, no doubt, disappointing experiences may have been to blame—at least there was not a full understanding of the needs of a growing crop or the means of meeting those needs.

In fertilizer studies with cover crops it was found that 100 pounds of nitrogen in the fertilizer (not 100 pounds of fertilizer) when broadcast on the surface in early spring (February) gave excellent results. Use of 50 pounds of nitrogen usually gave appreciable increases, but 25 pounds of nitrogen could seldom be detected either in the appearance of the cover crop or in the weighed amount of growth. A farmer using the light rate probably would have considered the fertilizer of no value, as was true because of its inadequacy. The farmer who used 100 pounds of nitrogen would have been well pleased with the results.

For Crop Increases

Crop increases cannot come from nothing. As one observer stated, to produce a big increase from so little fertilizer is an impossibility that would be quickly recognized with a little study of what takes place in plant growth where fertilizers are used. In the first place, the crop, the bacteria and fungi of the soil, and the soil itself compete for nutrients that are present or added as fertilizer. In the case of phosphates, soil fixation may commonly prevent two-thirds or three-fourths of the applied phosphorus from contributing to plant growth. In the use of fertilizer, this fact must be taken into consideration. A 10-ton tomato crop needs about 35 pounds of phosphoric acid for growth. But if the soil gets 105 pounds and the grower expects to add 10 tons to his yield with fertilizer, there would need to be at least 140 pounds of phosphoric acid applied per acre. This is equivalent to 700 pounds of 20 per cent superphosphate.

Nitrogen is the most evanescent element applied to the soil. It leaches readily and is likely to be lost in the drainage. Gaseous forms of nitrogen develop not only in the manure heap but in the soil, and losses may occur in this manner. A carbonaceous resi-

due such as straw in the soil results in a large utilization of nitrogen by bacteria and fungi that rot the straw. There is a good measure of uncertainty, therefore, as to what may happen when nitrogen fertilizer is used. A 10-ton tomato crop uses about 100 pounds of nitrogen, the amount supplied by 500 pounds of sulfate of ammonia. But if crop recovery is excellent and such a yield impossible, it may be necessary to supply more than 700 pounds of sulfate of ammonia to the soil to meet the crop needs for adding 10 tons to the yield. Results will probably be better if the application is broken up and a side-dressing or two is made at appropriate times. There would then be less chance for loss, and more of the nitrogen would go to the tomatoes at critical times in the growth period of the crop.

In the case of potash, the story is somewhat the same. Leaching losses are not usually high, but there is considerable fixation by the soil. At least a part of that fixed by the soil may ultimately become available to crops, but the immediate crop cannot get it. There is the necessity, therefore, to provide more than the amount that is equivalent to the demands of the crop increase that is expected. The same principle applies to all elements which crops need and which must be supplied in the fertilizer that is used.

For Greatest Benefit

An important part of the problem in the use of fertilizers is to use them in such a way that the crop can receive the greatest benefit. A study of methods and time of application has been very helpful in increasing the returns from fertilizers. Such things as keeping the fertilizer off the plants or seed are now pretty well understood. Recent studies have brought out certain advantages of deep application, often designated as "plow-sole" application. By this method, the fertilizer is concentrated in rills in the bottom of plow furrow. The fertilizer is then deep enough to be in moist soil during most of the growing season. In dry years, fertilizer is much more effective when applied deeply. The deep fertilizer may not become effective quite so early in the growth period, but it remains effective, if enough is used, until a good harvest is produced. There is also the minimum of soil fixation where the fertilizer is applied beyond the depth of cultivation. Mixing the soil and fertilizer by cultivation is a contributing cause of high fixation.

The most approved methods of fertilizer application make it possible to use heavy rates safely, whereas the same rates carelessly used might cause more damage than good. One grower is reported to have unwittingly mixed the soil and a large amount of fertilizer. He then set his tomatoes in the fertilized soil. Fortunately the mistake was discovered, but the tomatoes in the much-fertilized soil had to be reset. The same fertilizer a few inches away from the plant or on the plow sole probably would have worked well. I have seen excellent beans grown in basement subsoil where liberal fertilizers were applied on the plow sole. Liberal fertilizing also demands an adequate moisture supply if the fertilizer is to be most effective. However, drouth damages are minimized by adequate fertilizing.

Much of the drouth damage is due indirectly to lack of available nitrogen. Most of the organic matter is in the topsoil. Nitrates are produced by breaking down organic matter. Therefore, soils in dry weather are devoid of nitrates because nitrification cannot take place in dry soil. Moisture is necessary for the bacteria which form nitrates. That is why nitrogen fertilizer placed deep enough to be in moist soil is effective in partially overcoming drouth. Or the lawn fertilized in early spring before the drouth comes goes through dry weather better because some reserve of nitrogen has been stored in the root system of the grass and possibly in the deep soil to carry the grass through the dry period.

There are two critically important

times in the growth period of the plant. These are when growth starts and again at fruiting time. Booster solutions used on plants that are reset have been helpful in overcoming the shock of resetting. A light application of fertilizer in the row near the plants for seeded crops has proved helpful in giving the crop a good start. Side-dressings used later in the growth period, particularly just before fruiting, contribute to an improved harvest. At no time in the growth period, however, should plants be allowed to suffer because of lack of available nutrients, or both the quality and quantity of crop produced may be disappointing.

It is important to provide by complete fertilization that there be no nutrient deficiency, especially when high value crops are produced. Nitrogen alone may produce an increase, but the increase may be limited because there is not enough available phosphorus, potassium, sulfur, or some other element to support the maximum possible increase. An additional $5 an acre to include potash in the fertilizer program when a $500-per-acre crop is produced is the cheapest insurance against the reduced yields which might result from potash deficiency.

For Most Economy

The economic factor can never be overlooked in deciding upon fertilizer rates. A crop of corn would seldom be worth more than $100 an acre, even with high yields and high prices. A crop of filberts or walnuts, however, may bring more than $500, and a crop of cherries may bring more than $800. Other crops may bring even higher returns. On these crops any amount or kind of fertilizer necessary to get results can be used. Some orchardists in citrus areas have spent $100 an acre for fertilizer. The same expenditure on corn or wheat might be twice the total value of the crop. A fertilizer trial on filberts showed enough increase that the returns from one year would pay the cost of adequate fertilization for several years to come. An increase sufficient to return a profit for one year is acceptable to the farmer.

How much fertilizer to use then must be decided after considering many factors. Present yields are usually known within certain limitations. A 50-per-cent increase from adequate fertilization is a reasonable expectation. Doubling the yield is not impossible. We have more than quadrupled cover crop yields with fertilizers used in orchards. We have under favorable conditions increased the yields of nuts and fruits by 50 per cent.

The element of time must be given due consideration in planning the fertilizer program. Some crops are harvested six weeks after planting, and some may require more than six months. Orchards may not begin to bear for six years and may still be in production at 60 years. On early vegetables, fertilizer response is immediate if at all. On an orchard that is run down, a minimum of three to five years may be required to build enough vitality into the tree to show a response at harvest time. It is a very different problem then to fertilize a plant that grows from a tiny seedling to harvest in six weeks and fertilizing a stunted and starved tree which already has made a relatively enormous but inadequately nourished growth. These factors are particularly important influences that govern expected fertilizer responses.

In deciding on fertilizer rates, two major factors must be kept in mind. How many bushels, pounds, or tons are a reasonable expectation to add to the present average yield of crops? Then, after making due allowance for soil fixation and various other factors that affect crop yields so far as they can be anticipated, enough of the various known deficient elements with some margin of safety to produce the hypothetical crop increase that appears reasonable should be provided. Seldom perhaps will full expectations be realized, but the method is less haphazard

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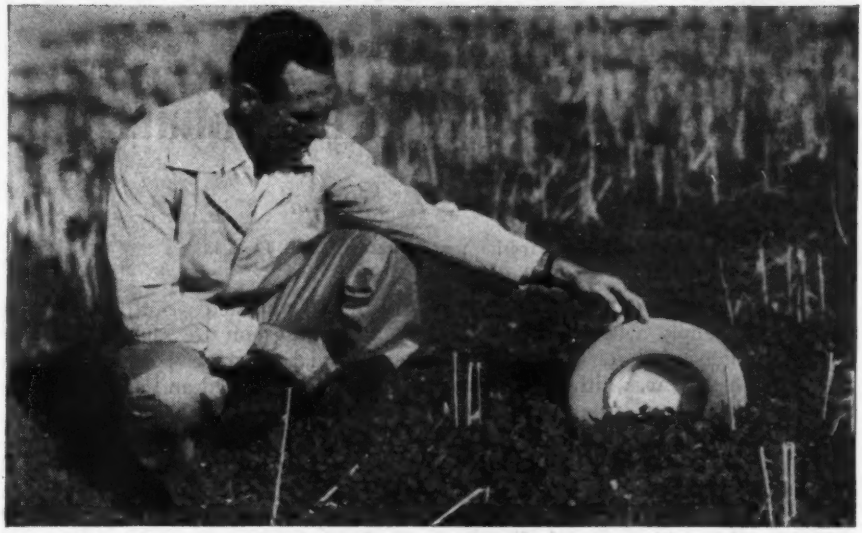

This white clover field on the J. E. Bertinot and Sons farm near Opelousas, La., over-seeded on rice stubble without any land preparation, received 250 lbs. of 20 per cent superphosphate and 10 lbs. of seed per acre in November 1944. The picture was taken March 9, 1945.

The Use of Clover in Rotation On Rice Land in Louisiana

By T. C. Beasley

Soil Conservation Service, Ruston, Louisiana

USED in the crop rotation to improve the soil and increase rice yields, white clover has also more than paid its own way in the production of seed, pasture, and hay on the J. E. Bertinot & Sons farm, six miles northwest of Opelousas, Louisiana, which is cooperating with the Grand Coteau Soil Conservation District.

That is the report of C. P. Dugal, manager of the farm. He points to the production in 1945 of over $11,000 in seed and hay from white clover. In addition, he said, the calf crop last spring was the best in the history of the farm. This was following the grazing of 50 acres of white clover, which had been seeded in 1944, together with the regular rice pasture and light winter feeding.

Use of the crop rotation is part of the conservation plan which Mr. Dugal worked out with the aid of Soil Conservation Service technicians assigned to the soil conservation district. Extension representatives helped establish the white clover. The whole Bertinot farm is irrigated but the drainage system is not adequate. This can not be corrected, however, until the main drainage canal—a community program—is completed.

The farm is in the extreme northeastern part of the Coast Prairie area. The land is almost level. Its soil—

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The Sources of Potash for Flue-Cured Tobacco

By F. A. Stinson

Dominion Experimental Substation, Delhi, Ontario

THAT muriate of potash may be used to supply a larger part of the potash in flue-cured tobacco fertilizers for Ontario than was hitherto believed advisable has been strongly indicated in tests carried out over the past 12 years at the Dominion Experimental Substation at Delhi, Ontario.

The earlier experimental work relating to this subject was designed to compare the commercial grading and yield of leaf where muriate, sulphate, and different portions thereof were used as sources of potash in the fertilizer for this crop. More recent work dealt with time of application of muriate of potash in relation to its effect on the crop. In these tests the behavior of chlorine and potassium in the soil and the influence of potash source on the burning quality of leaf received attention.

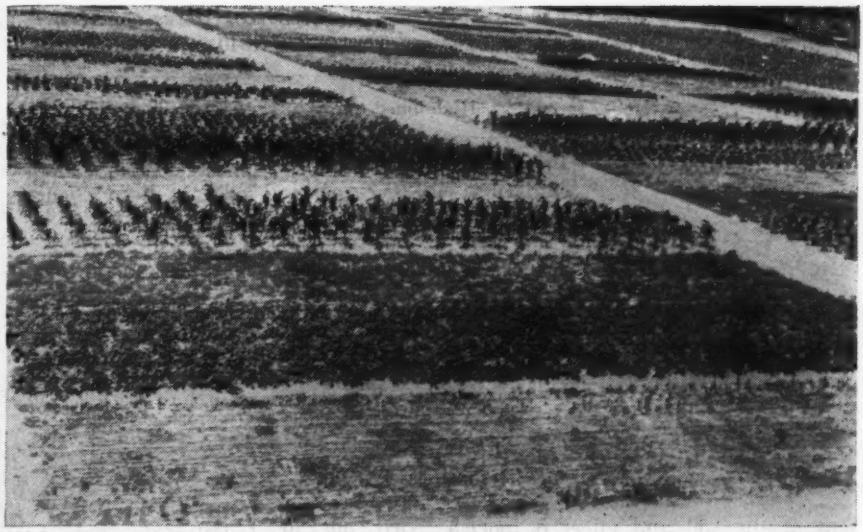
The fertilizer plots were laid out on uniform areas of Fox Sand which were cropped in two-year rye-tobacco rotations. The pH of this soil was 6.0. Quadruplicate plots, 1/32 acre in size were used. The standard fertilizer treatment consisted of 2-10-8 used at a rate equivalent to 1,000 pounds of commercial mixture per acre. This fertilizer was mixed and applied in the rows about a week before setting the seedlings. All other cultural operations were similar to those employed in handling a commercial crop with the exception that as the leaf matured in these plots it was primed and tagged with the plot numbers so that it could be identified throughout curing, grading, and weighing. Leaf from each plot was graded in accordance with the usual practice by employees of a commercial leaf processor. Grade indexes were calculated on the basis of yield of the different grades and the relative prices of these grades when sold to manufacturers.

The average results summarized in Table 1 for the six-year period 1933 to 1938 indicate an interesting relationship between source of potash and the leaf produced.

The results shown in this table would indicate that the yield of leaf was increased by replacing the sulphate

TABLE 1.—SIX-YEAR AVERAGE FOR FLUE-CURED TOBACCO WITH DIFFERENT SOURCES OF POTASH (1933-1938)

Treatment	Sources of potash	Grade index ¢	Yield per acre lbs.	Crop index $
A	Muriate of potash	27.1	1322	359
B	2/3 potash-muriate 1/3 potash-sulphate	27.4	1325	363
C	1/3 potash-muriate 2/3 potash-sulphate	27.9	1279	357
D	Sulphate of potash	27.0	1263	341



Crop rotation studies for flue-cured tobacco are an important part of the work at the Dominion Experimental Substation at Delhi, Ontario.

source with muriate up to two-thirds of the total. A slightly larger portion of the leaf fell into the higher priced grades where two sources of potash were used. In this test the presence of the higher rates of muriate of potash was accompanied by a small but significant increase in the percentage of the sponged-leaf grades. This factor was responsible for lowering the grade indexes for these treatments. As the presence of high chlorine in the leaf is known to cause an increase in the amount of starch and water in the leaf cells, this tendency toward sponging when cured in a kiln along with leaf receiving less chlorine is not surprising. It may be presumed that sponging while curing could have been effectively reduced in a kiln of leaf with uniform fertilization. Under ideal conditions for maturing, delayed ripening was sometimes noticeable where all of the potash was furnished in muriate form. Usually, however, differences in maturity were not in evidence and over the period of this test such differences failed to reach significant proportions.

With the impending shortage of sulphate of potash occasioned by the outbreak of war in 1939, the question of source of potash for flue-cured tobacco in Ontario took on a new significance and prompted further investigation of the subject. In this connection it was believed that practical use could be made of whatever difference might exist in the rate at which chlorine and potassium would disappear from the soil. Accordingly, a series of treatments was planned in which muriate of potash broadcast in the fall and one month before transplanting, respectively, could be compared with other treatments using different sources of potash in fertilizer applied in the usual way. During the spring of 1940 precipitation was unusually heavy and the results that year suggested that the potash was less efficient when applied in the fall and early spring. Accordingly, beginning in the spring of 1941 the early spring application was raised from 80 lbs. of K_2O per acre to 120 lbs. per acre and subsequent fall applications of muriate were made at the rate of 160 lbs. of K_2O per acre.

For the purpose of studying any possible relationship between lime con-

TABLE 2.—AVERAGE RESULTS WITH DIFFERENT SOURCES AND TIMES OF APPLYING POTASH FOR FLUE-CURED TOBACCO IN 1940

Treatment	Source of potash & time of application (80 lbs. K_2O per acre)	High-limed soil			Unlimed soil		
		Grade index ¢	Yield per acre lbs.	Crop index $	Grade index ¢	Yield per acre lbs.	Crop index $
A	Muriate of potash	22.7	1235	281	22.1	1077	222
B	¼ potash–muriate, ¾ potash–sulphate	20.9	1255	263	21.7	1001	217
C	Sulphate of potash	19.7	1237	244	21.9	975	213
D	Muriate of potash one month before transplanting	21.4	1187	253	21.7	967	210
E	Muriate of potash previous fall	19.5	1158	225	20.5	917	188

tent of the soil and effect of potash source on the leaf, the plots in this test were laid out on limed and unlimed soil, respectively, in the fall of 1939. The limed area was in the course of preparation for black root-rot studies and had received four tons of ground limestone and 10 tons of barnyard manure per acre in 1939. This area had produced a crop of tobacco in 1939. Although it was planned to repeat this test again the following year on the same soil, black root-rot had become by that time a dominant factor in limiting growth and this phase of the test had to be discontinued at harvest time. Tobacco followed rye on the unlimed area and each succeeding year this test was carried out in a two-year rye-tobacco rotation. The technique employed was similar to that described in connection with the previous tests.

The results shown in Table 2 might indicate that on the limed area there was a slight improvement in grade index following the application of muriate of potash. The lower grade after the fall application compared with that following the application broadcast in early spring would also suggest a favorable response to chlorine under these conditions. While no such response is evident in the results on the unlimed soil that year, the presence of appreciable leaching or fixation following applications of muriate of pot-

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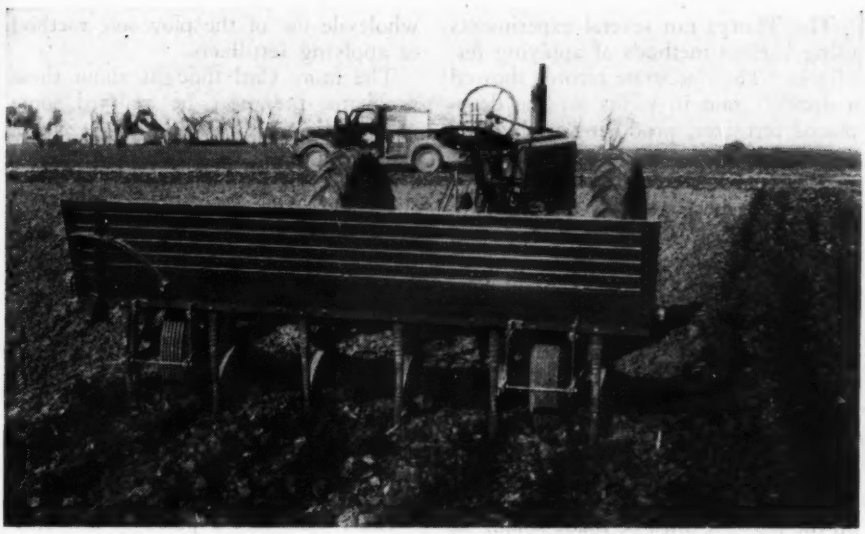
TABLE 3.—AVERAGE RESULTS WITH DIFFERENT SOURCES AND TIMES OF APPLYING POTASH FOR FLUE-CURED TOBACCO IN 1941

Treatment	Source of potash & time of application (80 lbs. K_2O per acre)	Grade index ¢	Yield per acre lbs.	Crop index $
A	Muriate of potash	23.9	1442	345
B	¼ potash–muriate, ¾ potash–sulphate	23.5	1445	357
C	Sulphate of potash	23.1	1494	345
D	Muriate of potash (120 lbs. K_2O per acre) one month before transplanting	23.4	1474	345
E	Muriate of potash previous fall	24.2	1465	355



The Thorp deep fertilizing machine in operation. Tubes carry the fertilizer from the large box, capable of holding 500 lbs. of fertilizer, to the base of the field cultivator shovels. The shovels can be regulated to a depth of six inches.

A New Machine for Deep Fertilization

*By E. W. Nordlinger**

Chicago, Illinois

A MACHINE capable of placing fertilizers at plow-sole depth and covering as high as 30 acres a day has been developed by a Central Illinois grower. Fertilizer placed at root depth in the soil or in the bottom of the plow furrow has been gaining advocates at a rapid pace. But growers have been hesitant to use this placement fully because of the present slow method of application.

Claude W. Thorp of Clinton, Illinois, was not completely sold on deep fertilization until this past season. He and his son, Carl, had heard many agricultural research men advocate placing fertilizer at root depth in the soil. The Thorps' main crop is suitable strains of hybrid seed corn for the Central Illinois region. Fertilizer is important to them and they faced this problem squarely—are we getting the most for the money and time spent?

In 1944, they tried out the much publicized plow-sole method. Fertilizers placed in the upper few inches of the soil are fine to start the plants off; but when the roots start going down as the plant becomes bigger, there must be plant food available down there to continue maximum growth.

* The author was formerly associated with the Purdue Agricultural Experiment Station, working with Drs. George Scarseth and J. D. Hartman on fertilizing problems. At present he is Crops Editor for the Food Packer magazine.

The Thorps ran several experiments using various methods of applying fertilizers. Their accurate records showed a decided gain in yields for the deep-placed fertilizer, producing as high as 30 per cent more sound corn with fuller ears. One plot yielded a net return of $11.27 per acre over row fertilization. Plow-sole fertilizing meant more profits for the time and energy spent.

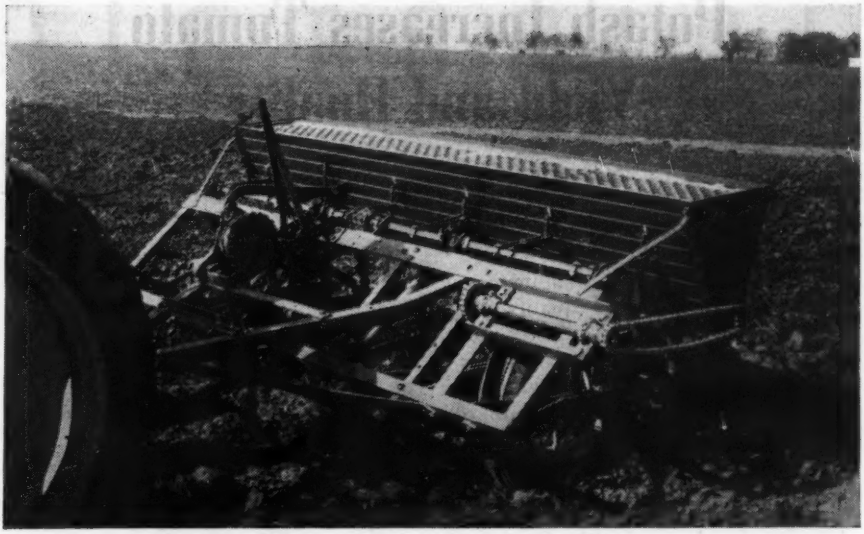
Then arose their biggest problem—how to get the fertilizer deep into the ground. Carl Thorp was most interested for he was just as irritated as the rest of the farmers with the present inconvenient methods which consist of a fertilizer box attached above the breaking plow. Since most of the weight of the box and its contents is on the plow, it must be made small. It holds 50 pounds although Carl enlarged his box to hold 100 pounds. But it still was inconvenient. Carl found 50 pounds went only one plow row. Then he would have to dismount and fill up the box again. That added up to plenty of waste motions. Often he found the weight of the fertilizer in the box influencing the plow depth. These and other reasons have prevented the wholesale use of the plow-sole method of applying fertilizers.

The more Carl thought about these problems, the more he realized some of the difficulties could be overcome. Last winter he attended the National Fertilizer meeting at Purdue University. Many prominent soils men were in attendance. When discussion lead to plow-sole fertilizing, Carl spoke up to inquire if some satisfactory machine had been developed to make this method easier to use. Even such advocates of the method as Drs. Scarseth of Purdue and Black of Iowa could not help Carl. However, R. H. Wileman of the Purdue Agricultural Engineering staff had been working on such a machine.

Later Carl had a personal conversation with Mr. Wileman and some surprising results came of it. Wileman had helped develop the initial fertilizer box attached to the plow. He, too, realized its limitations. Carl told him about a commercial fertilizer spreader he had built the previous year.

Back to Clinton went Carl with several good ideas for devoting his spare time to making a suitable deep-fertili-

The present method of applying fertilizers deep in the soil is by this attachment over the plow. Growers have found many disadvantages to this method. Carl Thorp solved many of these disadvantages by developing a new machine.



This side view of the Thorp machine shows the supports to hold the fertilizer container. The chain belts take the power from the ground wheels to run the reel within the container.

zing machine. A field cultivator was in his barn. He began to vision its curved shovels going down around six inches and placing the fertilizer there. The cultivator was nine feet wide, and with fertilizer being placed at each of the rear six shovels, it would cover plenty of ground, apply plenty of fertilizer, and save a lot of time. And that is exactly what it has done.

After a season's use this machine has proven very satisfactory. It can be easily assembled by any competent machinist, for it is just a container, similar to a grain box on a wheat drill, built on a field cultivator.

However, Carl has added many interesting devices that make this box different from any on the market. The box holds 500-800 pounds of plant food. So that big lumps will not hinder operation, a heavy iron screen (1¼-inch mesh) is on top of the box. A reel runs on the lower length of the box and is placed ⅛ inch from the bottom. Thus all small lumps of fertilizer are crushed before running in the tubes. This reel is run off the ground wheels of the cultivator with chain belts. Another unique feature is a special steel baffle plate directly above the reel. This takes the weight off the reel and provides smoother running as well as better crushing operations. Every farmer knows the benefits of such a baffle plate. It is hinged and runs the entire length of the box.

Carl found that his original fertilizer spreader, which was welded, was hard to dissemble for repairs, and so he used bolts on his latest machine. The bottom of the box is made of 4-inch channel iron with openings every 18 inches. The adjuster that regulates the slide is located on the back of the box at the left. It is suitable for applying as low as 300 pounds to the acre and as high as a ton per acre.

The fertilizer leaves the box through conventional tubes which run to a special heel on the cultivator shovel. At this spot Carl is not entirely satisfied with his "brain child." Fertilizer draws moisture out of the soil. Thus the fertilizer cakes around the lower opening of the heel, preventing free flowing. This is characteristic of all fertilizers. However, he believes that by using a broader shovel and a larger heel, the opening will not clog so often. He is incorporating this idea in a ma-

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Potash Increases Tomato Yield and Quality

By George R. Cobb

Salisbury, Maryland

FACED with the fact that increased yields and improved quality were necessary lest the tomato industry move to other states, County Agent Russell Wilson of Kent County, Delaware, and Dr. W. J. Dufendach and F. A. Schaedel, managers of Libby, McNeil and Libby branches at Houston and Wyoming, Delaware, decided that heroic measures were in order to save the tomato industry for the farmers of the State.

At a conference with officials of the Experiment Station it was recalled that in 1909 experiments with fertilizers on tomatoes were started and carried on for four years. Based on this work it was suggested that potash might be one of the limiting factors in tomato production in the State. The following table taken from Bulletin No. 101, written by C. A. McCue and W. C. Pelton in 1913, summarizes the four years' work:

	Yield in pounds	Per cent of ripe fruit
Average of four checks	10,979	78.4
600 pounds of a 4–8–10	17,339	88.
600 pounds of a 4–8–10 plus 20 tons of manure	23,279	81.8
250 pounds of superphosphate plus 120 pounds of muriate of potash	17,887	84.8
250 pounds of superphosphate	13,342	80.2
1,200 pounds of a 4–8–10	26,886	88.7
120 pounds of muriate of potash	15,248	85.0

It will be noted from the above table that 120 pounds of muriate of potash per acre increased yields nearly 5,000 pounds over the checks whereas 250 pounds of superphosphate showed but slightly more than a 2,000-pound increase, thus indicating that potash might be more of a limiting factor than phosphorus. The potash increased the percentage of fruits that ripened in addition to increasing the yield.

It was decided that a group of growers would be selected by the managers of the plants together with their fieldmen and County Agent Wilson and that these farmers would be given 200 pounds of muriate of potash to be applied as a side-dressing after the last cultivation. This 200-pound application was to be in addition to their regular fertilizer treatment.

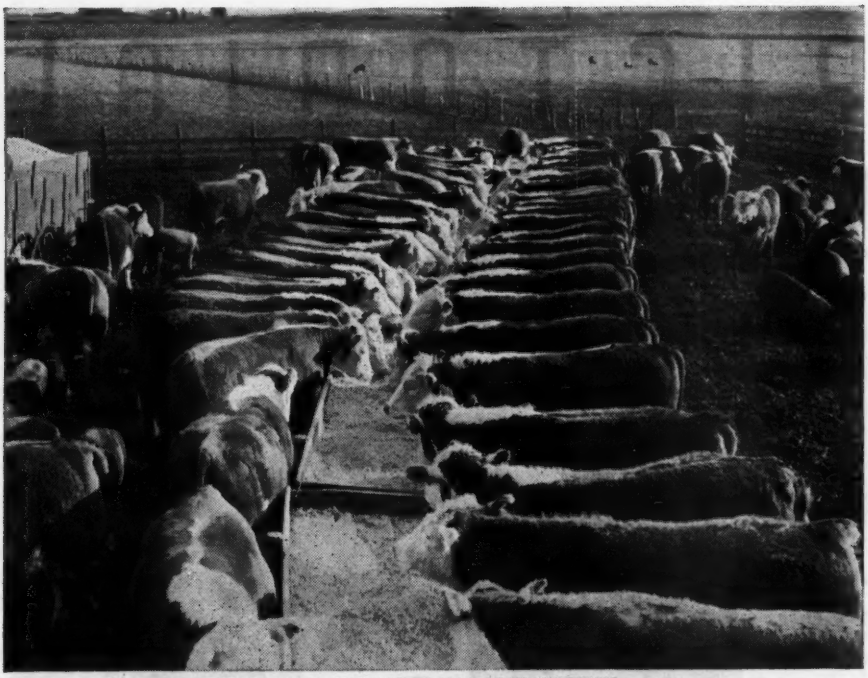
That this decision and its results were satisfactory is confirmed in the Annual Report of the Delaware Agricultural Extension Service for 1940 in which on page 7 is stated: "1940 saw the continuance of costs of production records and fertilization tests on tomatoes in Kent County. Twenty-five tomato growers maintained cost account records. Seventeen of these same tomato growers demonstrated that the use of 200 pounds of muriate of potash, in addition to regular fertilizers, increased the quality of the crop and boosted tomato production two tons per acre over the average of plots to which potash was not applied."

The growers to whom the potash was given were selected solely on the basis that they were reliable and might be counted on to report yields from the plots under demonstration. No account was taken of their ability as growers, size of farm, rotation of crops, fertility of soil, fertilizer practices, or location of farm. By selecting growers in this manner it was thought that a typical cross-section of the area would be obtained. Each grower fertilized his acreage as he wished, but in addi-

(*Turn to page* 45)

PICTORIAL

WHO IS DOING THE BAA-ING?

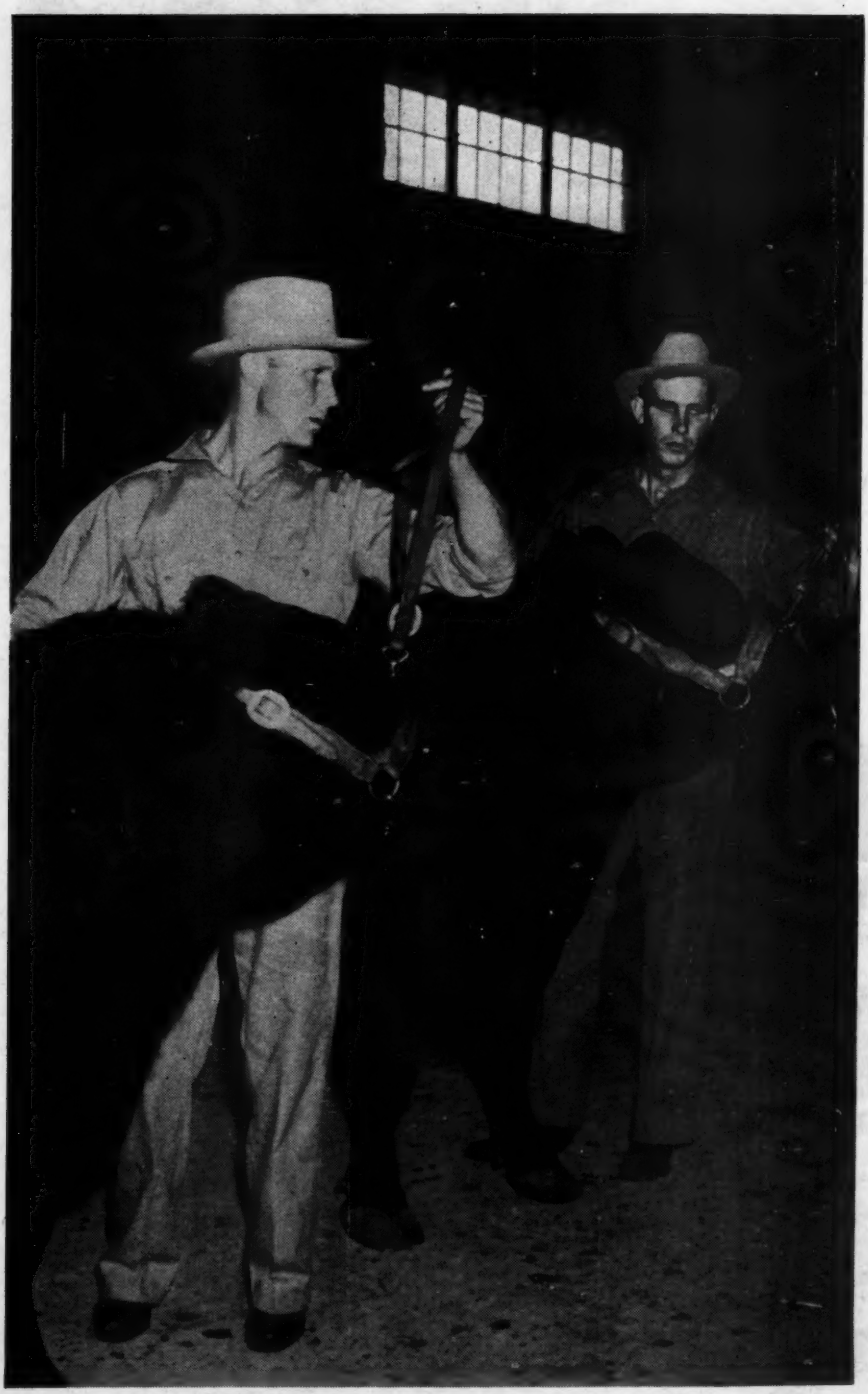


Above: A well-stocked feed line.

Left: Fuel for the meat factory.

Right: Winter satisfaction of summer labor.

Below: Quality produce in good display.



A COUPLE OF BLACK BEAUTIES WAITING FOR JUDGMENT

The Editors Talk

Agriculture 1946

American agriculture is now launched upon its first full postwar year. Answers to the speculation and problems of how the industry would fare in the reconversion period are in the process of being made. It would be unusual if some of the solutions are still not clear or that there be divergences of opinion on the best course to steer. However, the over-all picture is one that lends confidence in the capabilities of our farmers to produce in relation to a long-time view of their best interests.

To begin with, the announcement of 1946 goals dispelled doubts that the industry would suffer from the necessity of drastic reductions in production as a result of the return of peace. The 296 million acres of cultivated crops called for are 9 million acres more than were actually planted for 1945 crops. Including hay and hay seed crops, the final total of more than 357 million acres is 10 million more than the 1945 actual total. "The end of the war has not brought an end to the almost unlimited need for American food," Secretary of Agriculture Clinton P. Anderson said in recommending the goals to the states. "The 1946 goals indicate a pattern of production which provides continued high output of those commodities for which wartime demand is continuing and shifts toward peacetime levels for others."

The ability of American farmers to continue to meet goals is seen in an excellent discussion of this capacity by J. B. Hutson, Under Secretary of Agriculture and Administrator of the Production and Marketing Administration, before the Indiana Farm Bureau Federation at Indianapolis on November 15. "Looking at it from the over-all standpoint," he said, "the end of the war finds U. S. agriculture geared to a production level approximately 25% above the output of the prewar years. . . . It goes without saying that we will be able to produce plenty of food and fiber in the post-war period. The problem is not one of producing enough. Rather it is one of price relationships, of markets, and of distribution. . . . In short, the problem ahead is to stabilize farm prices and the farmer's income, while at the same time maintaining a high level of consumption and exports."

Mr. Hutson went on to say: "It seems to me that any discussion of these questions must necessarily center on: (1) the present productive capacity of the farm plant, and (2) the size and kind of market for which the farm plant will produce." He felt that most would agreed that given time to make the necessary changes, the plant could produce greatly in excess of the record production of the war period. Large areas of new land could be brought into cultivation, additional shifts to soil-conserving and higher-yield systems and crops could be made. The use of commercial fertilizer increased substantially during the war—the tonnage used was 85% greater in 1944 than in the pre-war years. Application of lime nearly tripled during the war period. Use of these materials could be greatly increased, he said.

Then turning to the period immediately ahead, he asked this question: With our farm plant presently geared to a level well above pre-war production, can production be maintained at this level in the reconversion period, and afterwards? For purposes of considering this question he divided farm production into three parts, (1) cash crops, such as wheat, cotton, tobacco, fruits and vegetables, and oilseed crops, (2) feed crops, such as corn, oats, barley, grain sorghums and hay, (3) livestock. Appraising the factors which might affect the production of each classification, it was his conclusion that it would be safe to count on a production capacity for cash crops of some 20% above that of prewar years; for feed crops, 25% above; and for livestock, 25 to 30% above prewar level.

With this capacity to produce one-fourth greater than at the beginning of the war, Mr. Hutson believes the basic answer to farm prosperity is to be found in high domestic consumption and a healthy export market. During World War II, per capita consumption of food was maintained at a level about 8% above prewar and the demand was not fully met. With a high level of employment and an adequate volume of trade with other countries, there probably will be a market ahead that will approximate the present capacity to produce at a level one-fourth above prewar.

Secretary Anderson has stated his conviction that a large part of the solution to the farm problem ahead must be sought in the direction of expanding the total market for agricultural products. One of the greatest contributions which we can make is to maintain full employment and at the same time develop international relations in such a way as to encourage foreign trade. "Under a full employment situation," he said, "the problems of agriculture will not all be solved. They will, however, be manageable. Even with full employment and an active foreign trade, many steps will be necessary in the fields of agricultural, labor, and business policies, if we are to have a sound and prosperous agriculture."

Among such steps are consumer education on improved diets and greater use of foods high in nutritive value and school lunch programs. These are close to home to most of us and will have our interest. However, if this war has taught nothing else, it has taught that our interests must be broadened. Anyone concerned with the prosperity of American agriculture must now realize its interdependence with the welfare of other industries and of this country with other countries of the world.

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Since January 1943 *Better Crops With Plant Food* has carried price data for certain farm commodities which were previously published in the *Potash Journal*. The yearly prices heretofore included for specific farm products have been on a calendar year basis. However, the price data currently published by the U. S. Department of Agriculture in their publication, "Agricultural Statistics," quote prices on a crop-year rather than a calendar-year basis.

During periods of rather stable prices, there is usually not such a great variation between annual prices calculated on a calendar-year or a crop-year basis. However, when the price of a given commodity fluctuates widely during the year, there may be considerable difference. Thus in certain cases there appeared a wide discrepancy between the figures previously carried in this publication and those published by the Bureau of Agricultural Economics of the U. S. Department of Agriculture. For that reason, it was believed desirable to revise the series in *Better Crops With Plant Food* so that the two would coincide. For each commodity with the exception of tobacco and truck crops, the crop year is indicated by the months at the top of the column.

Season Average Prices Received by Farmers for Specified Commodities *

Crop Year	Cotton Cents per lb.	Tobacco Cents per lb.	Potatoes Cents per bu.	Sweet Potatoes Cents per bu.	Corn Cents per bu.	Wheat Cents per bu.	Hay Dollars per ton	Cottonseed Dollars per ton	Truck Crops
	Aug.-July	.....	July-June	July-June	Oct.-Sept.	July-June	July-June	July-June	....
Av. Aug. 1909–July 1914	12.4	10.0	69.7	87.8	64.2	88.4	11.87	22.55	....
1920	15.9	17.3	125.3	141.7	61.8	182.6	16.46	25.65	....
1921	17.0	19.5	113.3	113.1	52.3	103.0	11.63	29.14	....
1922	22.9	22.8	65.9	100.4	74.5	96.6	11.64	30.42	....
1923	28.7	19.0	92.5	120.6	82.5	92.6	13.08	41.23	....
1924	22.9	19.0	68.6	149.6	106.3	124.7	12.66	33.25	....
1925	19.6	16.8	170.5	165.1	69.9	143.7	12.77	31.59	....
1926	12.5	17.9	131.4	117.4	74.5	121.7	13.24	22.04	....
1927	20.2	20.7	101.9	109.0	85.0	119.0	10.29	34.83	....
1928	18.0	20.0	53.2	118.0	84.0	99.8	11.22	34.17	....
1929	16.8	18.3	131.6	117.1	79.9	103.6	10.90	30.92	....
1930	9.5	12.8	91.2	108.1	59.8	67.1	11.06	22.04	....
1931	5.7	8.2	46.0	72.6	32.0	39.0	8.69	8.97	....
1932	6.5	10.5	38.0	54.2	31.9	38.2	6.20	10.33	....
1933	10.2	13.0	82.4	69.4	52.2	74.4	8.09	12.88	....
1934	12.4	21.3	44.6	79.8	81.5	84.8	13.20	33.00	....
1935	11.1	18.4	59.3	70.3	65.5	83.2	7.52	30.54	....
1936	12.4	23.6	114.2	92.9	104.4	102.5	11.20	33.36	....
1937	8.4	20.4	52.9	82.0	51.8	96.2	8.74	19.51	....
1938	8.6	19.6	55.7	73.0	48.6	56.2	6.78	21.79	....
1939	9.1	15.4	69.7	74.9	56.8	69.1	7.94	21.17	....
1940	9.9	16.0	54.1	85.5	61.8	68.2	7.58	21.73	....
1941	17.0	26.4	80.7	94.0	75.1	94.5	9.67	47.65	....
1942	19.0	36.9	117.0	119.0	91.7	109.8	10.80	45.61	....
1943	19.9	40.5	131.0	204.0	112.0	136.0	14.80	52.10	....
1944	20.7	40.8	149.0	192.0	109.0	141.0	16.40	52.70	....
December	20.85	43.5	150.0	175.0	106.0	145.0	16.50	53.10	....
1945									
January	20.20	41.9	158.0	190.0	107.0	146.0	17.10	52.80	....
February	19.99	31.8	165.0	201.0	106.0	147.0	17.70	52.70	....
March	20.24	21.4	171.0	207.0	107.0	148.0	18.10	52.00	....
April	20.20	21.4	174.0	211.0	107.0	149.0	16.90	51.90	....
May	20.51	42.2	177.0	214.0	108.0	149.0	16.50	52.10	....
June	20.90	51.2	180.0	220.0	111.0	150.0	15.90	52.50	....
July	21.25	56.3	183.0	230.0	112.0	146.0	15.40	55.00	....
August	21.33	44.9	167.0	256.0	113.0	145.0	14.60	52.50	....
September	21.72	43.2	138.0	207.0	112.0	145.0	14.30	51.40	....
October	22.30	45.9	126.0	180.0	113.0	151.0	14.30	51.00	....
November	22.52	46.7	131.0	186.0	111.0	153.0	14.90	51.30	....
December	22.84	43.8	137.0	194.0	109.0	154.0	15.40	51.40	....
Index Numbers (Aug. 1909–July 1914 = 100)									
1920	128	173	180	161	96	207	139	114	....
1921	137	195	163	129	81	117	98	129	....
1922	185	228	95	114	116	109	98	135	....
1923	231	190	133	137	129	105	110	183	....
1924	185	190	98	170	166	141	107	147	143
1925	158	168	245	188	109	163	108	140	143
1926	101	179	189	134	116	138	112	98	139
1927	163	207	146	124	132	135	87	154	127
1928	145	200	76	134	131	113	95	152	154
1929	135	183	189	133	124	117	92	137	137
1930	77	128	131	123	93	76	93	98	129
1931	46	82	66	83	50	44	73	40	115
1932	52	105	55	62	50	43	52	46	102
1933	82	130	118	79	81	84	68	57	91
1934	100	213	64	91	127	96	111	146	95
1935	90	184	85	80	102	94	63	135	119
1936	100	236	164	106	163	116	94	148	104
1937	68	204	76	93	81	109	74	87	110
1938	69	196	80	83	76	64	57	97	88
1939	73	154	100	85	88	78	67	94	91
1940	80	160	78	97	96	77	64	96	111
1941	137	264	116	107	117	107	81	211	129
1942	153	369	168	136	143	124	91	202	163
1943	160	405	188	232	174	154	125	231	245
1944	167	408	214	219	170	160	138	234	212
December	168	435	215	199	165	164	139	235	228
1945									
January	163	419	227	216	167	165	144	234	262
February	161	318	237	229	165	166	149	234	223
March	163	214	245	236	167	167	152	231	203
April	163	214	250	240	167	169	142	230	259
May	165	422	254	244	168	169	139	231	193
June	169	512	258	251	173	170	134	233	269
July	171	563	263	262	174	165	130	244	244
August	172	449	240	292	176	164	123	233	240
September	175	432	198	236	174	164	120	228	159
October	180	459	181	205	176	171	120	226	181
November	182	467	188	212	173	173	126	227	235
December	184	438	197	221	170	174	130	228	223

Wholesale Prices of Ammoniates

	Nitrate of soda per unit N bulk	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish scrap, dried 11–12% ammonia, 15% bone phosphate, f.o.b. factory, bulk per unit N	Fish scrap, wet acidulated 6% ammonia, 3% bone phosphate, f.o.b. factory, bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per unit N	High grade ground blood, 16–17% ammonia Chicago, bulk, per unit N
1910–14	$2.68	$2.85	$3.50	$3.53	$3.05	$3.37	$3.52
1922	3.04	2.58	6.07	4.66	3.54	4.75	4.99
1923	3.02	2.90	6.19	4.83	4.25	4.59	5.16
1924	2.99	2.44	5.87	5.02	4.41	3.60	4.25
1925	3.11	2.47	5.41	5.34	4.70	3.97	4.75
1926	3.06	2.41	4.40	4.95	4.15	4.36	4.90
1927	3.01	2.26	5.07	5.87	4.35	4.32	5.70
1928	2.67	2.30	7.06	6.63	5.28	4.92	6.00
1929	2.57	2.04	5.64	5.00	4.69	4.61	5.72
1930	2.47	1.81	4.78	4.96	4.15	3.79	4.58
1931	2.34	1.46	3.10	3.95	3.33	2.11	.46
1932	1.87	1.04	2.18	2.18	1.82	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.58	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.84	2.67	3.27
1935	1.47	1.15	4.59	3.10	2.65	3.06	3.65
1936	1.53	1.23	4.17	3.42	2.67	3.58	4.25
1937	1.63	1.32	4.91	4.66	3.65	4.04	4.80
1938	1.69	1.38	3.69	3.76	3.17	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.12	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.35	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.27	3.76	4.43
1942	1.74	1.41	6.11	5.77	3.34	5.04	6.76
1943	1.75	1.42	6.30	5.77	3.34	4.86	6.62
1944	1.75	1.42	7.68	5.77	3.34	4.86	6.71
December	1.75	1.42	7.81	5.77	3.34	4.86	6.71
1945							
January	1.75	1.42	7.81	5.77	3.34	4.86	6.71
February	1.75	1.42	7.81	5.77	3.34	4.86	6.71
March	1.75	1.42	7.81	5.77	3.34	4.86	6.71
April	1.75	1.42	7.81	5.77	3.34	4.86	6.71
May	1.75	1.42	7.81	5.77	3.34	4.86	6.71
June	1.75	1.42	7.81	5.77	3.34	4.86	6.71
July	1.75	1.42	7.81	5.77	3.34	4.86	6.71
August	1.75	1.42	7.81	5.77	3.34	4.86	6.71
September	1.75	1.42	7.81	5.77	3.34	4.86	6.71
October	1.75	1.42	7.81	5.77	3.34	4.86	6.71
November	1.75	1.42	7.81	5.77	3.34	4.86	6.71
December	1.75	1.42	7.81	5.77	3.34	4.86	6.71
Index Numbers (1910-14 = 100)							
1922	113	90	173	132	117	140	142
1923	112	102	177	137	140	136	147
1924	111	86	168	142	145	107	121
1925	115	87	155	151	155	117	135
1926	113	84	126	140	146	129	139
1927	112	79	145	166	143	128	162
1938	100	81	202	188	173	146	170
1929	96	72	161	142	154	137	162
1930	92	64	137	141	136	12	130
1931	88	51	89	112	109	63	70
1932	71	36	62	62	60	36	39
1933	59	39	84	81	85	97	71
1934	59	42	127	89	93	79	93
1935	57	40	131	88	87	91	104
1936	59	43	119	97	89	106	131
1937	61	46	140	132	120	120	122
1938	63	48	105	106	104	93	100
1939	63	47	115	125	102	115	111
1940	63	48	133	124	110	99	96
1941	63	49	157	151	107	112	126
1942	65	49	175	163	110	150	192
1943	65	50	180	163	110	144	189
1944	65	50	219	163	110	144	191
December	65	50	223	163	110	144	191
1945							
January	65	50	223	163	110	144	191
February	65	50	223	163	110	144	191
March	65	50	223	163	110	144	191
April	65	50	223	163	110	144	191
May	65	50	223	163	110	144	191
June	65	50	223	163	110	144	191
July	65	50	223	163	110	144	191
August	65	50	223	163	110	144	191
September	65	50	223	163	110	144	191
October	65	50	223	163	110	144	191
November	65	50	223	163	110	144	191
December	65	50	223	163	110	144	191

Wholesale Prices of Phosphates and Potash **

	Superphosphate Baltimore, per unit	Florida land pebble 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports[1]	Kainit, 20% bulk, per unit, c.i.f. Atlantic and Gulf ports
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657	$0.655
1922	.566	3.12	6.90	.632	.904	23.87	....	.508
1923	.550	3.08	7.50	.588	.836	23.32	....	.474
1924	.502	2.31	6.60	.582	.860	23.72	....	.472
1925	.600	2.44	6.16	.584	.860	23.72	....	.483
1926	.598	3.20	5.57	.596	.854	23.58	.537	.524
1927	.525	3.09	5.50	.646	.924	25.55	.586	.581
1928	.580	3.12	5.50	.669	.957	26.46	.607	.602
1929	.609	3.18	5.50	.672	.962	26.59	.610	.605
1930	.542	3.18	5.50	.681	.973	26.92	.618	.612
1931	.485	3.18	5.50	.681	.973	26.92	.618	.612
1932	.458	3.18	5.50	.681	.963	26.90	.618	.591
1933	.434	3.11	5.50	.662	.864	25.10	.601	.565
1934	.487	3.14	5.67	.486	.751	22.49	.483	.471
1935	.492	3.30	5.69	.415	.684	21.44	.444	.488
1936	.476	1.85	5.50	.464	.708	22.94	.505	.560
1937	.510	1.85	5.50	.508	.757	24.70	.556	.607
1938	.492	1.85	5.50	.523	.774	15.17	.572	.623
1939	.478	1.90	5.50	.521	.751	24.52	.570	.670
1940	.516	1.90	5.50	.517	.730	24.75	.573	....
1941	.547	1.94	5.64	.522	.780	25.55	.570	....
1942	.600	2.13	6.29	.522	.810	25.74	.205	....
1943	.631	2.00	5.93	.522	.786	25.35	.195	....
1944	.645	2.10	6.10	.522	.777	25.35	.195	....
December	.650	2.20	6.10	.535	.797	26.00	.200	....
1945								
January	.650	2.20	6.10	.535	.797	26.00	.200	....
February	.650	2.20	6.13	.535	.797	26.00	.200	....
March	.650	2.20	6.20	.535	.797	26.00	.200	....
April	.650	2.20	6.20	.535	.797	26.00	.200	....
May	.650	2.20	6.20	.535	.797	26.00	.200	....
June	.650	2.20	6.20	.474	.701	22.88	.176	....
July	.650	2.20	6.20	.503	.749	24.44	.188	....
August	.650	2.20	6.20	.503	.749	24.44	.188	....
September	.650	2.20	6.20	.503	.749	24.44	.188	....
October	.650	2.20	6.28	.535	.797	26.00	.200	....
November	.650	2.20	6.40	.535	.797	26.00	.200	....
December	.650	2.20	6.40	.535	.797	26.00	.200	....
Index Numbers (1910-14 = 100)								
1922	106	87	141	89	95	99	....	78
1923	103	85	154	82	88	96	....	72
1924	94	64	135	82	90	98	....	72
1925	110	68	126	82	90	98	....	74
1926	112	88	114	83	90	98	82	80
1927	100	86	113	90	97	106	89	89
1928	108	86	113	94	100	109	92	92
1929	114	88	113	94	101	110	93	92
1930	101	88	113	95	102	111	94	93
1931	90	88	113	95	102	111	94	93
1932	85	88	113	95	101	111	94	90
1933	81	86	113	93	91	104	91	86
1934	91	87	110	68	79	93	74	72
1935	92	91	117	58	72	89	68	75
1936	89	51	113	65	74	95	77	85
1937	95	51	113	71	79	102	85	93
1938	92	51	113	73	81	104	87	95
1939	89	53	113	73	79	101	87	93
1940	96	53	113	72	77	102	87	....
1941	102	54	110	73	82	106	87	....
1942	112	59	129	73	85	106	84	....
1943	117	55	121	73	82	105	83	....
1944	120	58	125	73	82	105	83	....
December	121	61	125	75	84	108	83	....
1945								
January	121	61	125	75	84	108	83	....
February	121	61	126	75	84	108	83	....
March	121	61	127	75	84	108	83	....
April	121	61	127	75	84	108	83	....
May	121	61	127	75	84	108	83	....
June	121	61	127	66	74	95	80	....
July	121	61	127	70	79	101	82	....
August	121	61	127	70	79	101	82	....
September	121	61	127	70	79	101	82	....
October	121	61	129	75	84	108	83	....
November	121	61	131	75	84	108	83	....
December	121	61	131	75	84	108	83	....

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

	Farm prices*	Prices paid by farmers for commodities bought*	Wholesale prices of all commodities†	Fertilizer materials‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash
1922.....	132	149	141	116	101	145	106	85
1923.....	143	152	147	114	107	144	103	79
1924.....	143	152	143	103	97	125	94	79
1925.....	156	156	151	112	100	131	109	80
1926.....	146	155	146	119	94	135	112	86
1927.....	142	153	139	116	89	150	100	94
1928.....	151	155	141	121	87	177	108	97
1929.....	149	154	139	114	79	146	114	97
1930.....	128	146	126	105	72	131	101	99
1931.....	90	126	107	83	62	83	90	99
1932.....	68	108	95	71	46	48	85	99
1933.....	72	108	96	70	45	71	81	95
1934.....	90	122	109	72	47	90	91	72
1935.....	109	125	117	70	45	97	92	63
1936.....	114	124	118	73	47	107	89	69
1937.....	122	131	126	81	50	129	95	75
1938.....	97	123	115	78	52	101	92	77
1939.....	95	121	112	79	51	119	89	77
1940.....	100	122	115	80	52	114	96	77
1941.....	124	131	127	86	56	130	102	77
1942.....	159	152	144	93	57	161	112	77
1943.....	192	167	150	94	57	160	117	77
1944.....	195	176	151	96	57	174	120	76
December..	200	178	152	97	57	175	121	78
1945								
January...	201	179	153	97	57	175	121	78
February..	199	179	153	97	57	175	121	78
March.....	198	180	153	97	57	175	121	78
April.....	203	180	154	97	57	175	121	78
May.....	200	180	154	97	57	175	121	78
June.....	206	180	155	95	57	175	121	69
July.....	206	180	154	96	57	175	121	74
August....	204	180	154	96	57	175	121	74
September.	197	181	153	96	57	175	121	74
October...	199	182	154	97	57	175	121	78
November.	205	182	155	97	57	175	121	78
December.	207	183	159	97	57	175	121	78

* U. S. D. A. figures. Beginning January 1946 farm prices and index numbers of specific farm products revised from a calendar year to a crop-year basis. Truck crops index adjusted to the 1924 level of the all-commodity index.

† Department of Labor index converted to 1910-14 base.

‡ The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] Beginning with June 1941, manure salts prices are F. O. B. mines, the only basis now quoted.

** The annual average of potash prices is higher than the weighted average of prices actually paid because since 1926 better than 90% of the potash used in agriculture has been contracted for during the discount period. From 1937 on, the maximum seasonal discount has been 12%.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizer

"Agricultural Mineral Sales as Reported to Date for Quarter Ended September 30, 1945," Bu. of Chemistry, Dept. of Agr., Sacramento 14, Calif., FM-118, Nov. 7, 1945.

"Commercial Fertilizer Sales As Reported to Date for the Quarter Ended September 30, 1945," Bu. of Chemistry, Dept. of Agr., Sacramento 14, Calif., FM-119, Nov. 7, 1945.

"Tonnage of Different Grades of Fertilizer Sold in Delaware 1944," Dept. of Agron., Agr. Exp. Sta., Newark, Del., C. E. Phillips.

"Influence of Commercial Fertilizers on Idaho Potatoes," Agr. Exp. Sta., Univ. of Idaho, Moscow, Idaho, Bul. 265, Aug. 1945, H. W. E. Larson and H. K. Schultz.

"Commercial Feeds, Fertilizers and Agricultural Liming Materials," State Insp. & Regulatory Service, College Park, Md., No. 195, Aug. 1945.

"Fertilizer Inspection, Analysis and Use; 1944," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Bul. 493, Aug. 1945, M. F. Miller, L. D. Haigh, E. W. Cowan, and J. H. Long.

"Fertilizer Sales in Ohio," Dept. of Agron., Ohio State Univ., Columbus, Ohio.

"Effect of Ammonium Nitrate As a Fertilizer for Spinach," Agr. Exp. Sta., Okla. A. & M. College, Stillwater, Okla., Bul. B-288, Oct. 1945, H. J. Harper and F. B. Cross.

"Distribution of Fertilizer Sales in Texas for 1944-45," Agr. Exp. Sta., A. & M. College, College Station, Texas, P. R. 960, Sept. 24, 1945, A. D. Jackson.

"Selecting Fertilizers," U.S.D.A., Washington, D. C., Cir. 487, Aug. 1945, Albert R. Merz.

Soils

"Save the Soil," Ext. Serv., Univ. of Conn., Storrs, Conn., Bul. 370, June 1945, N. P. Tedrow.

"Suggestions on Erosion Control," Agr. Ext. Div., Univ. of Ky., Lexington, Ky., Cir. 406, July 1945, George Roberts.

"Relation of the Physical Properties of Different Soil Types to Erodibility," Agr. Exp. Sta., Clemson Agr. College, Clemson, S. C., Bul. 357, May 1945, T. C. Peele, E. E. Latham, and O. W. Beale.

"Conserving Soil and Moisture in Orchards and Vineyards," U.S.D.A., Washington, D. C., F.B. 1970, Sept. 1945, John T. Bregger and Grover F. Brown.

"Some Soil Properties Related to the Sodium Salt Problem in Irrigated Soils," U.S.D.A., Washington, D. C., T. Bul. 902, Sept. 1945, Robert Gardner.

Crops

"Improving California Ranges," Agr. Ext. Serv., Univ. of Calif., Berkeley, Calif., Cir. 129, April 1945, Burle J. Jones and R. M. Love.

"Spring Wheat Production in Colorado," Agr. Exp. Sta., Colo. A. & M. College, Fort Collins, Colo., Bul. 487, Dec. 1944, D. W. Robertson, Dwight Koonce, J. F. Brandon.

"Prairie, A New Soft Winter Wheat for Illinois," Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., Bul. 513, July 1945, O. T. Bonnett, C. M. Woodworth, G. H. Dungan, and Benjamin Koehler.

"The Louisiana Farmers' Almanac 1945," Agr. Ext. Serv., La. State Univ., Baton Rouge, La., Cir. 236, Jan. 1945.

"Production of Tablestock Rutabagas in Michigan," Agr. Exp. Sta., Mich. State College, East Lansing, Mich., C. Bul. 197, June 1945, B. R. Churchill.

"The Hatch Dairy Experiment Station Farm," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Bul. 488, June 1945, C. W. McIntyre and A. C. Ragsdale.

"The Ability of Certain Legume-Grass Mixtures to Withstand Grazing," Agr. Exp. Sta., N. M., College of A. & M., State College, N. M., P. Bul. 1007.

"Alfalfa Production Investigations in New Mexico," Agr. Exp. Sta., N. M. College of A. & M., State College, N. M., Bul. 323, June 1945, Glen Staten, R. S. Stroud, and John Carter, Jr.

"Research and Farming," Agr. Exp. Sta., Univ. of N. C., Raleigh, N. C., A.R. 67, 1944.

"The Work of a Farm Forester," Agr. Ext. Serv., Univ. of N. C., Raleigh, N. C., E. Fold. 60, July 1945, R. W. Graeber.

"Annual Reports of the Ohio Agricultural Experiment Station 1939-1943," Ohio Agr. Exp. Sta., Wooster, Ohio, A.R. 59th-62nd, Bul. 658, May 1945.

"Cherry Rootstocks," Agr. Exp. Sta., Utah State Agr. College, Logan, Utah, Bul. 319, May 1945, Francis M. Coe.

"What's New in Farm Science," Agr. Exp. Sta., Univ. of Wis., Madison, Wis., A. R. 61, Part 2, Bul. 466, May 1945.

"Grading Soft Red Winter Wheat at Country Points," U.S.D.A., Washington, D. C., AIS-33, Oct. 1945.

"The Water Requirement of Alfalfa," U.S. D.A., Washington, D. C., Cir. 735, Sept. 1945, Carl S. Scofield.

Economics

"Georgia Farm Prices 1910-1943," Ga. Exp. Sta., Univ. System of Ga., Experiment, Ga., Bul. 239, March 1945, G. B. Stong, J. C. Elrod, and W. E. Hendrix.

"Postwar Program for Idaho Timber Production on the Forest Lands," Agr. Exp. Sta., Univ. of Idaho, Moscow, Idaho, Cir. 99, May 1945.

"Postwar Program for Idaho, The Farm Woodlands," Agr. Exp. Sta., Univ. of Idaho, Moscow, Idaho, Cir. 100, May 1945.

"Cost of Producing Milk in Northern Illinois," Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., Bul. 511, June 1945, R. H. Wilcox and C. S. Rhode.

"Financial Position of a Representative Group of McHenry County Farmers in the Dairy Region of Northern Illinois 1940-1942," Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., Bul. 512, June 1945, B. D. Parrish and L. J. Norton.

"Postwar Farm Jobs and Farmers' Purchase Intentions," Ext. Serv., Univ. of Ill., Urbana, Ill., Cir. 592, Oct. 1945, A. T. Anderson and R. C. Ross.

"Complete Costs and Farm Business Analysis on 24 Farms in Champaign and Piatt Counties, Illinois," Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., AE. 2334, July 1945, R. H. Wilcox and J. R. Harris.

"Suggested Adjustments in Kansas Agriculture for 1946," Agr. Exp. Sta., Manhattan, Kansas, Rpt. 27, July 1945.

"Wartime Land Market Activity in Northern Nevada," Agr. Exp. Sta., Univ. of Nev., Reno, Nev., Bul. 174, June 1945, H. V. Stonecipher, Howard Mason, and Dora Dunn.

"Facts for Prospective Farmers and Ranchers in South Dakota," Agr. Exp. Sta., S. Dak. State College, Brookings, S. Dak., Cir. 59, June 1945, C. R. Hoglund.

"Crop and Livestock Adjustments by Production Areas in South Dakota," Agr. Exp. Sta., S. D. State College, Brookings, S. D., AE-Pamph. 12, May 1944.

"An Appraisal of South Dakota Production Adjustments in Agriculture, Wartime & Suggested 1945," Agr. Exp. Sta., S. D. State College, Brookings, S. D., AE-Pamph. 13, July 21, 1944.

"Post-War Farming Adjustments and Opportunities in South Dakota," Agr. Exp. Sta., S. D. State College, Brookings, S. D., AE-Pamph. 14, Nov. 1944, C. R. Hoglund.

"Agricultural Production Texas 1946," Agr. Exp. Sta., College Station, Texas, Nov. 1945.

"Financing Truck Crops in Three Eastern Virginia Counties," Agr. Exp. Sta., Va. Polytechnic Inst., Blacksburg, Va., Bul. 369, April 1945, Harry M. Love.

"Agriculture's Wartime Production Capacity for 1946, Washington," Agr. Exp. Sta., State College of Wash., Pullman, Wash., A. E. 8, July 1945.

1946 Agricultural Conservation Program Bulletin," U.S.D.A., Washington, D. C., ACP-1946, Oct. 12, 1945.

"Committeeman's Practice Handbook, 1946, NCR-46-1, Ind., Ia., Mich., Minn., Mo., Ohio, Neb., S. D., Wis.," U.S.D.A., Washington, D. C.

"Price Spreads Between Farmers and Consumers for Food Products 1913-44," U.S.D.A., Washington, D. C., M. P. 576, Sept. 1945.

"What Peace Can Mean to American Farmers," U.S.D.A., Washington, D. C., M. P. 582, Oct. 1945.

"Wages of Agricultural Labor in the United States," U.S.D.A., Washington, D. C., T. Bul. 895, July 1945, Louis J. Ducoff.

"Income Parity for Agriculture," U.S.D.A., Washington, D. C.

Soybeans Need Lime, Phosphorus, Potash

By A. L. Lang

Department of Agronomy, University of Illinois, Urbana, Ill.

(Reprint from Soybean Digest, September 1945)

LIMESTONE is the number one requirement of soybeans on acid soil. Even though soybeans are well adapted to a wide variety of soil conditions and perform better than most cereals on acid soils, still they are sensitive to mineral deficiencies and respond well to properly used soil amendments.

In 1944 the 71 million bushels of soybeans harvested in Illinois took from the soil almost twice as much calcium as the 400 million bushel corn crop. At the same time they removed more potassium and one-half as much phosphorus as the corn. The 71 million bushels of soybeans removed from the soil 120 million pounds of calcium, phosphorus, and potassium, while 400 million bushels of corn removed only 20 million pounds more or 140 million pounds of the same elements. In terms of liming and fertilizing materials the 1944 Illinois bean and corn crop removed from the soil calcium, phosphorus, and potassium equivalent to 20,000 tons of limestone, 320,000 tons of rock phosphate, and 200,000 tons of potassium chloride. Even at the present time when more fertilizing materials are being used than ever before in the history of the country landowners and operators are falling far short of returning to the soil the plant food removed by the corn and soybeans alone.

No wonder thinking people are concerned.

But let's blame the culture, not the crop.

The high mineral requirement of the soybean plant and its inherent ability to forage its nutrients beyond the range and scope of other crops tend to give it an undeserved bad reputation for being a soil robber or depleter. But, as a matter of fact, when truly evaluated, *that inherentability of the soybean plant to ferret out plant nutrients that other crops cannot reach makes it surprisingly suited to the Cornbelt cropping system.* The soybean follows the corn crop as effectively and in the same manner as the porker follows the steer in the feed lot. If the steers are well fed the hogs need very little attention. Likewise, the soybean—if the corn crop is well fed, the bean crop will need little or no fertilization.

The problem, then, of returning plant food removed from the soil by the soybean crop becomes not one of direct application applied for the plant itself, but rather a matter of determining the needs of the entire cropping system and making the applications to those crops which can use them most effectively.

In analyzing the needs of a typical Cornbelt rotation including corn, soybeans, small grain, and legume hay for a heavily cropped level to rolling prairie soil, many factors need to be considered. The key to high productivity on such a soil when measured in bushels of corn and soybeans is the amount of legumes that can be plowed down preceding the growing of the corn crop. The legume supplies the large quantity of nitrogen without which the corn crop cannot make maximum yields. In addition, the legume supplies organic matter which in turn gives tilth, aeration, and water-holding capacity to the soil, all of which are as vital as minerals supplied through fertilization. The amount of a legume which can be grown is largely determined by the nutrient-supplying power of the soil and so the first efforts to soil improvement should be directed to and for the legume hay pasture or manuring crop. *When sufficient limestone, phosphate, and potash are applied to meet the maximum requirements of the legume forage crop in the rotation, grain crops like corn and soybeans will be amply cared for, provided enough of the forage crop is returned to the land in either green or animal manures.*

For the average Cornbelt soil this means 2 to 4 tons of ground limestone every 8 to 10 years; for most soils it also means 1,000 to 1,500 pounds of finely ground rock prosphate every 8 to 12 years or its equivalent in superphosphate, 500 to 800 pounds an acre each rotation. Where potassium is shown to be deficient by test, then 200 to 400 pounds of potassium chloride per rotation will do the job either all applied for the clover or divided between the clover and grain crops.

This outlined fertilizer program for soybeans has been proved to be effec-

tive by more than 30 years of results from the many permanently established outlying soil experiment fields in Illinois. It is simply and easily put into practice by owner and tenant operators alike.

The Fertilizer Rate Problem

(*From page* 18)

than the entirely too common practice of applying whatever amount or kind of fertilizer may be conveniently obtained. After consideration of the possible fertilizer needs to produce a good crop increase, due consideration must be given to the value of the increase. If 10 bushels can be added to a 20-bushel wheat yield, a relatively small fertilizer application is all that is economically justified. If, on the other hand, 5 tons can be added to a 10-ton yield of green beans while the price is more than $100 per ton, the cost of the fertilizer can be forgotten. All that is needed then is the courage to go out and apply what common sense and one's best judgment signify should be used. With adequate attention to proven information relative to fertilizer rates and usage, much increased production and considerable increase in profits could be added to the present level of production and income.

The Sources of Potash for Flue-Cured Tobacco

(*From page* 22)

A well-nourished, flue-cured tobacco plant.

ash in the fall and early spring is strongly indicated. Table 3 contains data for the 1941 crop, which was preceded by a winter and spring with unusually light precipitation. There is no indication there that the efficiency of potash was lowered by having been applied the previous fall.

None of these data, including those shown in Table 4 for the three years (1942-44), would indicate a likelihood of muriate of potash adversely affecting the grade of leaf, particularly if applied in the early spring or the previous fall. In order to ensure comparable yields it would seem that broadcast applications made previous to the time of transplanting tobacco would have to be increased considerably depending on the length of time intervening.

TABLE 4.—AVERAGE RESULTS FOR THREE YEARS WITH DIFFERENT SOURCES AND TIMES OF APPLYING POTASH FOR FLUE-CURED TOBACCO 1942-1944

Treatment	Source of potash and time of application (80 lbs. K_2O per acre)	Grade index ¢	Yield per acre lbs.	Crop index $
A	Muriate of potash	24.1	1367	330
B	¼ potash–muriate ¾ potash–sulphate	25.0	1331	333
C	Sulphate of potash	24.5	1363	334
D	Muriate of potash (120 lbs. K_2O per acre) one month before transplanting	24.6	1382	340
E	Muriate of potash (160 lbs. K_2O per acre) previous fall	25.5	1315	336

Soil samples taken periodically, beginning at the time the muriate of potash applications were made in the fall of 1940 and spring of 1941, respectively, were tested for the presence of chlorine using Spurway methods. In general, these tests indicated a more rapid disappearance of chlorine than potassium. The tests failed to show the presence of chlorine at transplanting time on the limed area where muriate of potash had been applied the previous fall while on the unlimed area chlorine was found present six weeks after transplanting. At the latter date higher amounts of chlorine were present when the muriate of potash was applied in the early spring than when it was applied the previous fall.

Burn tests were carried out on representative samples of cured leaf from each plot in 1940. Analysis of the results from 80 'burns' for each treatment revealed no significant relationship between duration of burn and fertilizer treatment. It may be explained that an entirely satisfactory technique

A group of agriculturists inspecting a tobacco fertilizer test plot in Norfolk County, Ontario.

for testing the burning quality of unmanufactured flue-cured tobacco leaf has not been developed. Burning quality of Canadian-grown flue-cured tobacco is generally regarded as excellent, however, and the present work gives no indication that this reputation would be jeopardized through somewhat fuller use of muriate of potash as a source of this nutrient.

Crop Production Horizons

(*From page* 15)

I am thinking right now of our old dependable hay crop, timothy. Even with all the educational effort poured into our campaigns for more acres and better yields of alfalfa and clover, we find on our Wisconsin farms nearly two million acres of timothy and other grass hays. In some areas, the physical factors of soil tillage and rotation make it difficult to keep one-third to one-fourth of our crop acreage in legumes. We know that the chief limiting element in the production of maximum yields of timothy is nitrogen. This past year (1945) the writer carried out a large number of demonstrations with nitrogen fertilizer applied as a top-dressing on old timothy meadows. Most of these trials were conducted in the Lake Superior district of northern Wisconsin where a good 75 per cent of all the hay harvested by farmers is timothy and quack grass with perhaps 10 per cent to 20 per cent of clover. The soil type in this area ranges from heavy clay to sandy loams.

The response of these old timothy meadows to nitrogen was amazing. Ammonium nitrate (33 per cent) was applied at 200 lbs. per acre in the early spring as a top-dressing. In every case (27 demonstrations conducted) the increase in yield was considerably more than enough to pay for the fertilizer—in fact, the average increase for all of these acre demonstration plots was 2,185 pounds of hay. Not only a ton more hay per acre, but this nitrogen-treated hay was leafier, darker green in color, and higher in its protein content. (See Table 3.)

Figuring the value of this better quality timothy at $20 per ton, we show an average profit of $15.85 over and above the cost of the fertilizer. Putting it another way, it appears that we can produce this extra ton of more palatable hay at a cost of about $5.50. In many cases, we doubled the yield which amounts to the equivalent of doubling the size of the farmer's hay acreage, and this means a lot to our northern Wisconsin farmers operating on their small farms with their 30-40 and 50 acres of crop land.

Here again I must emphasize the fact that the continuous use of nitrogen fertilizer year after year on these

TABLE 3.—AVERAGE OF 27 DEMONSTRATIONS ON TIMOTHY (AMMONIUM NITRATE APPLIED AS A TOP-DRESSING)

Treatment and rate per acre	Average yield per acre	Average increase per acre	Cost of fertilizer	Value of increase	Profit over cost of fertilizer
Ammonium nitrate at 200 lbs.	4921 lbs.	2185 lbs.	$6.00	$21.85	$15.85
No fertilizer	2736				

old timothy and grassland meadows will eventually deplete the reserves of minerals. True, most of these timothy meadows are plowed up and reseeded occasionally and at such times farmers should apply liberal amounts of phosphate-potash fertilizers. These fields should be limed if acid. The occasional application of phosphated manure to these old timothy meadows will help to maintain adequate levels of phosphorus and potash.

There is still another place where we are now recognizing an opportunity for increasing the yields of farm crops through the use of nitrogen fertilizers. We in Wisconsin have finally come to the use of nitrogen on grain (both for fall-seeded wheat and rye and spring grains). For many years we have discouraged the use of nitrogen in fertilizers for spring grain. But now comes Vicland oats into the picture. This new variety of oats which is resistant to rust and smut and a high yielder is inherently short-strawed. Wisconsin farmers in 1945 grew over 2½ million acres of this new variety. Where grown on our sandy soils and on the light-colored silt and clay loams, in average to low fertility, it makes a poor growth of straw, too short in fact to produce maximum yields. Vicland oats will make plenty of straw on fields containing adequate amounts of nitrogen. I am, therefore, convinced that Wisconsin farmers could use nitrogen fertilizers with profit on at least one-half or more of the oats grown in Wisconsin. And not only on our Vicland oats but on barley where grown on low-fertility, nitrogen-deficient soils. For several years we have recommended the top-dressing of rye and winter wheat with nitrogen fertilizers in the spring.

There is the danger, of course, of producing too much straw, and in dry seasons we may thus jeopardize our seedings of clover or alfalfa. A farmer must use good judgment and discretion in his use of nitrogen fertilizers. One point should be made clear at this point in our discussion relative to the use of nitrogen on the grain crop. Bear in mind that we must first of all supply adequate amounts of phosphate, potash, and lime as basic treatments. When the grain and legume requirements for these minerals are satisfied, we may then consider the use of nitrogen.

This past year (1945) we carried out a number of demonstrations where ammonium nitrate was applied at rates of from 60 to 70 pounds per acre as a top-dressing on plots which had been previously treated with 0-20-0 and 0-20-10 or 0-20-20. The results are summarized in Table 4.

TABLE 4.—AVERAGE YIELDS FOR EIGHT PLOTS—1945—IN BAYFIELD, ASHLAND, IRON, AND PRICE COUNTIES WHERE A COMPARISON WAS MADE OF 0-20-0 WITH 0-20-10 OR 0-20-20, WITH AND WITHOUT AMMONIUM NITRATE. (AMMONIUM NITRATE APPLIED AS A TOP-DRESSING AT AVERAGE RATE OF 63 LBS. PER ACRE AFTER SEEDING.)

Treatment (Av. for all plots)	Crop	Yield per acre grain	Yield per acre straw	Bushels increase grain	Pounds increase straw	Value of increase grain & straw	Cost of fertilizer	Net profit per acre
265 lbs. of 0–20–0	Oats	49.6	1880	13.4	371	9.64	3.63	6.01
265 lbs. of 0–20–0 plus 63 lbs. of ammonium nitrate	Oats	58.2	2361	22.0	852	16.43	5.36	11.07
265 lbs. of the average of 0–20–10 & 0–20–20 plots	Oats	59.4	2314	23.2	805	17.09	6.02	11.07
265 lbs. of 0–20–10 & 0–20–20 plots (average) plus 63 lbs. of ammonium nitrate	Oats	67.2	2791	31.0	1282	23.35	7.75	15.60
No fertilizer	Oats	36.2	1509					

In most every trial we observed a marked increase in the growth of straw on the plots top-dressed with ammonium nitrate. In no case on the plots conducted in 1945 did we seriously hurt the "catches" of clover or alfalfa.

The results tabulated in Table 4 definitely show a substantial profit from the nitrogen.

When it comes to rye, wheat, and oats grown on sandy soils in dry years, I am certain we would definitely hurt our seedings of clover and alfalfa. And here is a suggestion I would offer to farmers operating on sandy farms. If the size of your farm permits, grow, let's say, part of your grain *for grain* and omit your legume seedings. Fertilize liberally with nitrogen, phosphate, and potash. Make these acres produce maximum yields of grain. In turn withhold nitrogen from the acreage you are seeding to legumes and grasses. In fact, cut down on your nurse crop rate of seeding and give these fields liberal treatment with phosphate-potash mixtures. In the case of fields of oats, barley, rye, or wheat grown for grain and where legume seedings are omitted, we can use fertilizers relatively higher in their content of nitrogen—as for instance, the 10-6-4 or 8-8-8. Where, however, we are seeding down with legumes cut down on nitrogen and use mixtures relatively higher in phosphate and potash such as the 3-12-12, 0-20-20, or even 0-10-20.

Plow Sole Fertilizers

This story would not be complete if I did not say something about the opportunity for increasing the yields of corn and other row crops on low fertility fields through the application of liberal amounts of a balanced plant food by the plow-sole or deep-placement method.

In our effort to achieve the ultimate goal of abundant production of all crops grown on our farms through a program of lime-phosphate-potash and legumes, some of us have failed to fully recognize the immediate opportunity for increasing yields on land where no manure is available and where little or no fertilizer has ever been used in the grain, legume, corn rotation. Thousands of farmers every year are wearing out their machinery and expending their energies on acres and acres of impoverished soils where crop yields are low and quality poor. And so I ask the question, "Why not give these farmers a commercial fertilizer substitute for manure?" The answer to this question is our recommendation of such grades of fertilizer as 8-8-8 or 6-6-18 at rates up to 1,000 pounds per acre for corn, sugar beets, tobacco, cabbage, tomatoes, and potatoes. Where applied with an attachment on the plow or placed in bands by other devices at depths of from six to eight inches, these high-nitrogen fertilizers will make possible the production of good crops on well-aerated soil. I cannot see anything wrong with this idea. It is a short cut to higher yields and lower production costs. Certainly we do recommend that farmers rotate their crops and include legumes in the rotation. Organic matter and good soil aeration are important. We caution against the plowing under of high-nitrogen fertilizers on those heavy-textured soils where the tilth is poor or where compaction has resulted from plowing heavy soils when too wet.

In Wisconsin there are thousands of acres of well-aerated but low fertility soils, where the liberal application of 8-8-8 or 6-6-18 will produce profitable increases in the yields of corn and other crops. In our plow-sole demonstrations carried out in Wisconsin during the past four years, we have produced increases in the yields of corn ranging from 10 to 70 bushels per acre through the application of from 700 to 800 pounds of 8-8-8 fertilizer. Profitable increases in the yields of potatoes, sugar beets, tobacco, and rutabagas have been shown in numerous demonstrations.

The farmer himself will eventually have to answer the questions, "How much fertilizer should I apply per acre?" and "Does it pay?" Prices for the crop he grows together with the cost of the fertilizer, as well as the amount of fertilizer he applies per acre and finally the increases which he is able to obtain from its application, will give the farmer his answers. Our job

is one of determining the most effective method of applying large amounts of fertilizer. The deep placement of plant food in bands down in the moist soil where the feeding roots of growing crops are able to make good use of this plant food during the midsummer period of peak demand is our present answer to the question of the most efficient method of feeding corn and certain other crops with commercial fertilizer. We still recommend some hill or row "starter" fertilizer even where the heavier applications of complete balanced plant food are plowed under or placed deep by the plow-sole or other methods.

Supplies of Nitrogen Abundant

We now have in the United States and Canada some 13 or 14 synthetic ammonia plants, most of them built during the past four or five years. These plants have been turning out vast quantities of ammonium nitrate, a material used in the manufacture of explosives. But strange as it may seem, this same ammonium nitrate used as an ingredient in gunpowder and loaded into bombs for the killing of men and the destruction of property can also be used to produce farm crops. Abundant supplies of ammonium nitrate or other nitrogen fertilizers such as ammonium sulphate, nitrate of soda, calcium cyanamid, and urea will be available in the years to come, and with this increased capacity for nitrogen production in this country comes a new horizon in our potential crop production possibilities.

Yes, we have poured billions of dollars into the World War II in order to protect ourselves against the aggression of those powers which threatened our very existence. Let us now bear in mind that our future and ultimate security are of equal importance. We cannot continue to exploit our greatest source of wealth and well-being. We must continue to battle the forces of nature and of human indifference and carelessness in this great program for the conservation and preservation of our greatest national heritage—the soil. "To Save our Soil is to Save our Country."

Potash Increases Tomato Yield and Quality

(*From page* 26)

tion to his regular application he applied 200 pounds of muriate of potash per acre as a side-dressing at the last cultivation. Soil samples taken from the several fields, as might be expected, showed wide variations, but most of them showed potash to be Low or Low plus with a pH ranging from 5.4 to 6.8.

This study was carried on for three years, from 1939 to 1941, inclusive, and each year the potash plots showed a substantial increase in yield over the plots not receiving the extra potash. W. I. Boyd, Fieldman, in his annual report for 1941 has this to say: "The gain in yield for the 9 who kept records ranged from 12 baskets per acre to 123 baskets per acre for an average gain of 65 baskets" (60 baskets to the ton). His report continues, "This year was the second year to carry on this project in this locality. The 1940 project which resulted in an average gain of 61 baskets per acre created considerable interest in the use of potash among our growers. The 1940 project caused us to sell fully three times more potash than ever before." Incidentally the first year's work was confined to growers in the Houston area and Mr. Boyd alludes to growers in the Wyoming section of the State or those growers who deliver their tomatoes to the Wyoming plant.

Dr. W. J. Dufendach, Manager of

the Houston Plant of Libby, McNeil and Libby, reports, "During the season of 1940 I found that the use of 200 pounds of muriate of potash per acre above the regular fertilizer treatment increased our quality from 12 to 16 per cent."

The three years work might be summarized as follows:

Year	No. of growers	Baskets increase from potash
1939	9	69
1940	19	77
1941	22	40
Baskets increase, 3 years		186

Average gain per 200 pounds of muriate was 62 baskets or over a ton per acre.

A typical report on a year's work is taken from a report compiled by Kenneth Baker of the Delaware Extension Service—1941 project:

Number of cooperators	19
Yields per acre	533 with extra potash vs 456 without the potash
Costs per acre	$80.61 vs $78.51
Returns per acre	$127.92 vs $106.21
Net profits per acre	$47.31 vs $27.70

John Miller:

	Baskets
Check	324
200 cyanamid	334
200 muriate of potash	410
200 of each	432

The above treatments were given in addition to regular fertilizer applications. For instance Mr. Johnson applied 800 pounds of a 3-8-10 mixture per acre broadcast while Mr. Miller applied 1,000 pounds of superphosphate per acre plus 12 tons of manure.

It will be noted from the above report that muriate of potash showed a very distinct increase in the yield; in Mr. Miller's case it showed an increase of 86 baskets. The combination of 200 pounds of cyanamid plus 200 pounds of muriate of potash seemed to be the best amounts under the conditions of this test.

That potash alone increases yields is also demonstrated by work that Dr. Jackson B. Hester did at the Campbell Soup Company in 1940. The following table is printed with the permission of Dr. Hester:

FERTILIZER TREATMENT

Plowed Down		Side-Dressed			
Cyanamid (lbs.)	0–0–50 (300 lbs.)	0–0–50 (300 lbs.)	10–10–15 (750 lbs.)	10–0–15 (750 lbs.)	10–0–30 (750 lbs.)
0	12.26 Tons	15.37 Tons	10.66 Tons	11.96 Tons	11.37 Tons
100	15.71 "	14.00 "	13.00 "	12.66 "	10.98 "
200	13.65 "	16.68 "	12.12 "	11.26 "	11.32 "
400	12.48 "	12.96 "	10.41 "	12.65 "	13.10 "
600	14.17 "	14.25 "	13.24 "	14.18 "	12.86 "

In addition to the larger group selected to demonstrate that extra potash would pay several other growers were asked to test out the use of cyanamid with and without potash. Clifford Johnson reported as follows:

	Baskets
Check	91
200 cyanamid	292
400 cyanamid	223
200 muriate of potash	311
200 of each	360
400 cyanamid plus 200 muriate of potash	320

The land received 1,000 pounds of superphosphate before plowing. It will be noted from the above table that 200 pounds of cyanamid plowed down plus 300 pounds of muriate of potash applied as a side-dressing gave the best yield—almost 17 tons per acre, but it should also be noted that 300 pounds of muriate applied as a side-dressing without any cyanamid produced 15.37

tons per acre. This yield was higher than any yield when NPK or NK were applied as side-dressings and stood third in yields of all plots. The 0-0-50 (potash) was applied at rate of 300 pounds per acre while the other mixtures were used at a 750-pound rate per acre.

High-potash treatments not only improved the quality but also resulted in more early fruit. This was substantiated by Dr. R. P. Thomas, University of Maryland, who reported that it was very noticeable that high potash produced more early fruit and that nitrogen alone and manure tended to decrease early ripening. "The heavy application of potash, that is doubling the amount in the mixture, gave very large increases in fruit which had been picked by the middle of the season." Dr. Hester states: "It has been observed that the fruit on plants getting a large amount of potash matures dark red and carries a high amount of sugar and acid which is a factor in high quality."

In cooperative work with growers in New Jersey it was found that potash pre-applied, that is, applied some time before the plants were set, produced more early fruits than did the potash which was used as a side-dressing, but the plants with the side-dresser remained green longer in the season and the resulting crop was larger than was that on the pre-applied plots. This tendency to early maturity was also noted in cooperative demonstrations with growers in Talbot County, Maryland, where the plots getting 18 per cent potash produced 94 baskets per acre before any fruit was picked from the 6 per cent potash plots.

Incidentally peppers which are considered in the same class as tomatoes in reference to their fertilizer needs were under tests conducted by Agricultural Students at the Bridgeville, Delaware, High School with the following results:

	Baskets
(1) Check—500 pounds of a 3–8–10.....	210
200 pounds muriate of potash side-dressed in addition to the above...	336
(2) Check.....	246
200 pounds muriate of potash as side-dressing.....	306

These typical examples showed increases from the 200 pounds of muriate of potash per acre of 126 and 60 baskets, respectively, under the conditions of soil and climate under which the above reported fertilizer tests were conducted, tomatoes as well as peppers have shown significant increases in yields and returns per acre from liberal applications of potash as a side-dressing. Growers throughout the area have readily adopted the practice and regard this extra fertilization as essential for bigger yields and better quality.

A New Machine for Deep Fertilization

(*From page* 25)

chine he is assembling this winter. Even though the heel opening will be larger, the material will flow at the same rate for the amount is governed by the slide openings in the box.

When you look at the photos of the machine, it appears as a factory-built unit. However, it was made from available new material. It did a fine job for the large amount of fertilizers the Thorps used last Spring. A total of 120 tons of 8-8-8 was used for deep placement. That would have taken a great deal of time if applied through the former small fertilizer box. By using the Thorp attachments, neighboring farmers reported fertilizing as high as 20-30 acres per day.

Just about every farm has a field cultivator. The local farm repair shop

could easily assemble the parts necessary to turn that cultivator into a deep-fertilizing machine.

Although many farmers may disapprove another operation in preparing the ground, there are decided benefits. To prevent excessive leaching of plant food, a good practice is to fertilize just a week or two before seeding or planting. Good plowing time is late fall and very early spring and so a farmer stands to benefit by separate plowing and fertilizing operations.

Because of poor weather conditions, as was noticed in several sections last spring, a farmer must change his crop plans. Thus he benefits by late fertilizing for he can use the correct analysis for the chosen crop and still be assured of a profitable yield.

A New Legume for the South

(*From page* 8)

ducted in 1942 and 1943 by the Mississippi Extension Service show an average yield of 11,719 pounds of green material per acre where basic slag or superphosphate and lime were used. When 100 pounds of muriate of potash were added, the yield was increased to 19,669 pounds of green material per acre. The results are shown in the table below:

	Lbs. green wt.
1. J. M. Kimbrough, Lexington, Miss.	
250 lbs. superphosphate	5,445
250 lbs. superphosphate 100 lbs. muriate of potash	9,692.1
250 lbs. superphosphate 300 lbs. muriate of potash	13,939.2
2. R. M. Branch, Goodman, Miss.	
500 lbs. lime 250 lbs. superphosphate	5,227.2
250 lbs. superphosphate 100 lbs. muriate of potash 60% 500 lbs. lime	11,325.6
3. R. M. Branch, Goodman, Miss.	
500 lbs. lime 250 lbs. superphosphate	7,187.4
500 lbs. lime 250 lbs. superphosphate 100 lbs. muriate of potash 60%	16,661.7
4. H. W. Vandiver, Cruger, Miss.	
No treatment	15,681.6
100 lbs. muriate of potash	28,749.6
5. W. S. Pittman, Winona, Miss.	
500 lbs. basic slag	11,107.8
500 lbs. basic slag 100 lbs. muriate of potash 60%	16,226.1
6. C. S. Hamer, Kilmichael, Miss.	
500 lbs. basic slag	16,988.4
500 lbs. basic slag 100 lbs. muriate of potash 60%	28,636.3
7. Scott Wafford, Mantee, Miss.	
500 lbs. basic slag	11,211
500 lbs. basic slag 100 lbs. muriate of potash 60%	14,592
8. J. E. Scarbrough, Cumberland, Miss.	
200 lbs. superphosphate	20,908
200 lbs. superphosphate 100 lbs. muriate of potash 60%	31,472

Fertilizing helps to make a better winter growth and therefore increases the yield of green manure in the spring. Applying the superphosphate and muriate of potash to the peas is probably as effective as to apply it to the crop which follows the peas.

Harvesting

Harvesting is best done with a combine if the wild peas are planted on well-prepared, smooth land, and if there are no weeds. If the peas are dry, the combine may be run over the field and the peas sacked as they come out of the combine. The peas may then be stored in a dry, well-ventilated storage room. Precaution should always be taken to prevent heating or molding. If the peas are sacked, the sacks should be stood up in a single layer in the storage room. If the peas contain an unusual amount of moisture, they should be spread out in a thin layer on a tight floor where they remain until dried sufficiently to keep in sacks.

In some instances there are too much

Johnson grass and too many weeds to harvest the peas with a combine, in which case it becomes necessary to cut them with a mower, rake in windrows, and from the wind-rows shock and stack. Threshing is then done from the stack. This is the safest and probably the cheapest way to save wild winter pea seed, as the seed will be completely dried before threshing and therefore there will be no danger of heating or molding. By using this method, it is possible to cut before the peas begin to shatter and consequently more peas are saved. Cut at the proper time, few peas will shatter in the process of curing and placing in the stack. If a good thresher is available there is little doubt that this is the best method of harvesting.

The Use of Clover in Rotation on Rice Land in Louisiana

(*From page* 19)

Lake Charles silty clay loam—is deep, fine-textured, and takes in water slowly. The dark gray silty clay loam surface soil is about eight inches deep and is underlain by a medium-to-dark gray silty clay or clay subsoil. Developed under a grass cover, the soil originally had a good supply of organic matter.

Rice has been the farm's principal crop for the last 25 years, under a system of alternate years in crop and pasture. The pasture consisted of rice crop residue and voluntary stands of native grasses and weeds.

The amount of organic matter in the soil declined under the system until the operators noted the change in soil structure. This became evident as the land became harder to work. Further, Mr. Dugal said that there had been a gradual but steady decline in yields during the last quarter of a century.

The first seeding of white clover, preceded by application of 350 pounds of 20 per cent superphosphate fertilizer per acre, was in rice stubble on a 50-acre field or "cut" in November 1943. This field is now in rice and, according to Mr. Dugal, the crop is noticeably better there than on the other land. The use of white clover is given credit for the improvement.

Two 50-acre "cuts" and one of 20 acres were seeded to white clover in 1944, each given an application of 250 pounds of 20 per cent superphosphate per acre. One of the 50-acre "cuts" was disked three times, fertilized, and packed with a cultipacker before seeding. The remaining two "cuts" were seeded directly on rice stubble. Seeding was begun the first week in November and completed in the first week in December. Ten pounds of seed were sown per acre. Fifty per cent muriate of potash was also applied at the rate of 100 pounds per acre on two acres.

The areas seeded the first of November made better growth than those seeded in early December. This is taken to indicate that seeding in the latter part of October will give best results in this area. Production was at least as good where the clover was seeded in rice stubble as it was where the land had been disked and packed.

Results on the two acres where potash was applied have caused Mr. Dugal to decide to use it on all future white clover seedings. The growth and seed yield were much heavier there than on any other part of the farm, he reports. He also said that by August this year those two acres were the only ones where there was a good stand of clover for grazing. All of the clover had been grazed, but the plants in the other 118 acres had died during July.

Production from the 120 acres of white clover, not including the grazing, amounted in 1945 to 13,000 pounds of

clean No. 1 seed valued at 70 cents a pound ($9,100), 1,800 pounds of less clean and adulterated seed valued at 40 cents a pound ($720) which Mr. Dugal expects to use on the farm, and 1,100 bales of hay valued at $1.25 a bale ($1,375). This totals $11,195, or over $93.00 an acre.

In addition, Mr. Dugal is of the opinion that as much seed shattered out and remained in the fields as was harvested. A field examination made August 10 revealed that there was enough seed on the ground to assure a good second-year stand.

Thus, the three purposes for introducing white clover into the crop rotation are accomplished—production of a salable crop when rice is not grown, improved pasture for livestock, and higher rice yields following clover through soil improvement by use of a legume in the rotation.

On the basis of this experience, it is believed that white clover and lespedeza should be a definite part of the cropping systems for rice-livestock farms in the Coast Prairie area. It also seems amply demonstrated that the use of phosphate and potash fertilizers will usually be necessary to produce maximum yields and in many cases to produce even profitable yields of white clover.

Tomorrow

(*From page* 5)

while to take the second course is to be cowardly and negative.

If I toted this philosophy out to Main Street to chat about it with the boys I know best, I think they would be brave and honest about the propositions facing us. I imagine they would take the following attitude:

The gang who usually start wars are the ones who take little risk in fighting them. The peace-loving farmer never seeks a war with country dwellers in other lands—as Thomas Carlyle pointed out a long time ago, without getting much results I fear. It is usually the ambitious money barons, the plotting diplomats (or the blundering ones), the scheming politicians who can't curb their tongues, the half-baked meddlers, and the power-drunk dictators who cajole or frighten their people into the catastrophe of licensed carnage. As a rule, such geezers never smell much gun-powder. They let farm and factory workers shoulder arms.

But now things may be different. If the atomic bomb is only half what they say it is and the production secret leaks out, these war-mongers are going to think a couple of times before they get sassy. Any taste of this new-fangled warfare will sour their stomachs. They won't be so able to dodge it. Their own necks will be perpetually extended. They won't be able to hide somewhere and do their bit with slogans and false alarms. But at best that's a poor way, too, in which to bring about peace.

I wish there was some money available to make real first-hand educational methods work in furtherance of peace. Probably the new big international bank scheme or any of the UNO programs falls short of getting this done among the common people, the ones who have to face the brunt of battles. So far a lot of this paper work is 'way over our heads.

Too many of the commentators and columnists and chitter-chatters horn in on subjects which they know less about than the common folks, and by dint of their racket and din they manage to get everybody confused and distraught. Nothing dispells misunderstanding so fast as to have folks get acquainted.

So if we could set up some kind of international good will fund to help

pay the expenses of a few farmers and factory workers to travel back and forth from country to country at intervals—traffic both ways and in all directions—it might rid us of some prejudice. The radio and the newspaper and trade magazine columns might report their trips and give space to their experiences. Neighborhood gatherings would listen to their reports and look at their photographs.

Let them go into the homes and working places of foreign lands without being directed or propagandized. Of course, our own returning soldiers have had some valuable lessons in world unity, but the impressions gained in wartime under disrupted conditions are not as reliable as an exchange of views during the lulls of peace when more war clouds gather.

I would not hand-pick these citizen ambassadors by any favored political, religious, or racial method. I would let nominations for such missions be in the hands of groups by industrial and regional lines, and give them passports, funds to travel modestly, and require strict accounting of expenses. If the Government balked at such overseas missions, maybe some rich corporation or association of commercial agencies might like to test it.

ON this end we could set up welcome committees composed of similar groups of people to handle these foreign citizen ambassadors. Air travel will soon make such trips less costly and lengthy. If we brag so much over the smallness of the world in distance and time, why not cement its parts more securely?

Now to keep on with this educational theory, why not put into our high schools a new course in world affairs and world relations? In the past six months so much good has been done, on paper anyhow, toward a better understanding, that we can't afford to let it molder in the files.

Fetch out those Bretton Woods organizations, the Food and Agriculture Organization, the Export-Import bank loans, the credit to Great Britain, the progress of UNRRA, and the Big Three conferences. Get a teacher to "hone up" on the topics or send to the State Department for references. Have class work in the high school daily on these momentous milestones. Give exams on them, encourage interclass debates about them. Hang up a trophy for the kids who show extreme skill in understanding and explaining these clearly. Make these affairs ours. Right now they belong to a Mr. Stettinius or a Mr. Byrnes or else we just dismiss them with a yawn and look for the current hog market and the comic strips.

IF we got an order to assume some grave responsible task or shoulder some special assignment because we were known to be without question the strongest and most able ones to undertake that task, would we go off on a wild spree or hide out and shudder to avoid it? I expect that parallel goes as much for the nation itself as it does for us. Our country can't dodge its responsibility for world leadership either. We suddenly find ourselves on top of the heap. What are we going to do about it?

First, it strikes a lot of us ornery outlanders that we mustn't start off by thinking we alone are the morale creme de creme, or that our righteousness is the acme of perfection which all must imitate. Nor may we assume blindly that our economic system is something to dose every other country with.

Second, let's not be too apologetic or critical either of our vantage point. Maybe our form of democracy and our brand of economic management is cock-eyed in places, but above all else it is geared to deliver the goods and get the most there the first. By finding a way to keep that same old machine running without friction in normal times we can do ourselves and the rest of the world a favor.

This isn't the first and only time we have been stalled on dead center with

lots of jobs waiting for the old flywheel to turn. America has a habit of prolonging internal strife and bickering just for the fun of it, I guess. But it won't last forever. The disagreers will get weary of getting nowhere fast, and by and by they will come in and settle things by compromise. Let's just hope the stalling and jawing won't get contagious and infect the farmers too widely, or else a lot of us will miss more than pineapple and butter on the table.

Ten chances to one the key that finally unlocks the closed doors to progress and unbars the deadlocks among us will be produced from the mind of some individual, some person skilled in certain lines. That's why I refuse to believe that we must grope around in the dark eternally as victims of an over-organized era. The individual thinks things out from pressure—the kind of mass pressure we are feeling everywhere now.

I suppose most of us on the sidelines feel that what we do or say or hope for will not bring about a millennium. Yet we have much more of a loud say-so as individuals than a majority of the citizens of other countries. It is in our own work-a-day expressions and ideals that we give incentive to those best able to lead and inspire us. You can bet on one thing—that if we ourselves out here in the mob forget to act right and plan square and fair, we are laying ourselves open to bad leadership.

SO I repeat that the bright dawn of tomorrow shines for us ordinary geezers regardless of what office we hold or aspire to. Not only do we make up the vote and pressure of mass opinion, but we are quite apt to hatch out a prodigy in our midst with enough pep and zip to think up a new way out of old troubles.

So with this echo of a resolution flung at you, I take a bow and wish you all a New Year of surging activity in behalf of making the world safe for decency.

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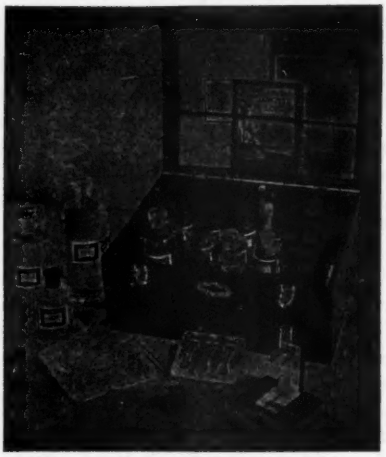

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Fertilize Potatoes for Quality and Profits (Pacific Coast)
Fertilizing Small Fruits (Pacific Coast)
Better Corn (Midwest) and (Northeast)
Fertilize Pastures for Better Livestock (Pacific Coast)
Of Course I'm Interested (Pastures, Canada)
Meet the Family (Canada)

Reprints

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N-9 Problems of Feeding Cigarleaf Tobacco
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S-5-40 What Is the Matter with Your Soil?
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NN-8-45 The Effect of Borax and Lime on Quality of Cauliflowers
OO-8-45 Potash Fertilizers Are Needed on Many Midwestern Farms
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THE AMERICAN POTASH INSTITUTE

1155 16TH STREET, N. W. WASHINGTON 6, D. C.

Little Willie had gone to bring the kittens in. His father, hearing a shrill meowing, called out: "Don't hurt the kittens, Willie."

"Oh, no," said the youngster, "I'm carrying them very carefully by the stems."

Mandy surrounded by her brood was talking to a spinster settlement worker. "Yes'm, birth control am all right for you all, but me, ah's married, an' doan need it."

The discharged sergeant walked into the barber shop, draped himself into the barber chair and without a second glance said to the barber: "Shave and a haircut."

The barber picked up the brush and started to lather the face. He stopped in the middle of the operation, a smile of enormous proportions spreading over his face as he reached for the razor:

"Well," he said heartily, "If it isn't my old sergeant!"

First Window Washer: "Look at that guy in there kissing another man's wife. Let's go in after the big bum!"

Second Window Washer: "All right, how soon do you think he'll leave?"

"Is that girl's dress torn, or am I seeing things?"

"Both."

An author bought a farm in upper New York State because he thought it would be a good place to write. When an inquiring neighbor asked, between spurts of tobacco juice, what crops the stranger intended to raise, the author was momentarily stumped. Then he happened to recall what his wife had said about the city being no place to bring up children.

"I'm going to raise children," he said brightly.

The farmer spat meditatively. "Around here," he said, "we look on that as a sideline."

Private: "I bought her a fine dinner, took her to the best show in town, then to a night club, and do you know what she said?"

Corporal: "No."

Private: "Oh, you've been out with her, too."

A young mother had just unburdened herself and told her son the facts of life. At the end she said, "Now, if you want to know anything, ask me."

The boy appeared in serious thought, then gravely turned to his mother and said, "How do they get the Saturday Evening Post out on Wednesdays?"

"Winter draws on," Josh remarked absently as he tucked Maggie into his cutter for an old-fashioned sleigh ride.

"Is that any of your business?" replied Maggie, icily."

Need for—

BORON IN AGRICULTURE

Authorities have recognized that the depletion of Boron in soil has been reflected in limited production and poor quality of numerous field and fruit crops.

Outstanding results have been obtained with the application of Borax in specific quantities or as part of the regular fertilizer mix, improving the quality and increasing the production of alfalfa and other legumes, table beets, sugar beets, apples, etc.

The work of the State Agricultural Stations and recommendations of the County Agents are steadily increasing the recognition of the need for Boron in agriculture. We are prepared to render every practical assistance.

Borax is economical and very little is required. It is conveniently packed in 100 lb. sacks and stocks are available for prompt delivery everywhere in the United States and Canada. Address your inquiries to the nearest office.

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Such long-established loyalty among so many fine folks is a mighty sound endorsement for V-C Fertilizers. It means that year after year V-C scientific research, V-C practical farm experience and V-C manufacturing skill continue to provide better and better V-C Fertilizers for every crop on every soil on every farm.

It also means that when you buy V-C Fertilizers, you are getting an honest and dependable product manufactured and sold by people who value your friendship and your confidence.

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Useful Information for the Busy County Agent

Today the County Agent is guide and mentor to millions. His job of helping farmers grow better crops has taken on new proportions. Now he is directly responsible for the success of Victory Gardeners who are doing so much to increase America's food supply.

One subject on which the County Agent wants to be well-informed is the protection of seed against soil-borne and seed-surface fungi. Seed protection is important in any season—and is especially important in a cold, wet planting season like the one just past.

Write today for latest reports on the use of Spergon to protect seed; increase emergence; stimulate growth; improve stands and yields. Information about this non-injurious, easy-to-use seed treatment deserves a place in your working library.

Advantages of Spergon

- Safe to use—cannot harm delicate seeds, even when used in excess.
- Safe for user—non-poisonous and non-irritating to those applying it to seed.
- Long lasting—Spergon does not deteriorate with age; may be applied months in advance of planting.
- Self-lubricating. No graphite needed in drill.
- Compatible with legume inoculants.

TYPICAL DOSAGES

Corn	1½ oz. per bu. seed
Peas	2 oz. per bu. seed
Beans (including Limas)	2 oz. per bu. seed
Soybeans	2 oz. per bu. seed
Sorghum	1½ oz. per bu. seed
Flax	2 oz. per bu. seed
Peanuts,	3 oz. per 100 lbs. seed

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THE PLANT SPEAKS

A new four-reel series of 16 mm., sound, color films which may be booked independently or in any combination. They may be used to best advantage when shown at least one day apart and in the following sequence:

THE PLANT SPEAKS THRU DEFICIENCY SYMPTOMS pictures soil depletion, erosion, and deficiency symptoms on plants. (Running time 25 min. on 800-ft. reel.)

THE PLANT SPEAKS, SOIL TESTS TELL US WHY depicts taking soil samples on the farm and the interpretation of soil tests. (Running time 10 min. on 400-ft. reel.)

THE PLANT SPEAKS THRU TISSUE TESTS shows the value of tissue testing and the procedure for testing plant tissues in the field. (Running time 14 min. on 400-ft. reel.)

THE PLANT SPEAKS THRU LEAF ANALYSIS evaluates leaves in plant growth and leaf analysis in determining fertilizer needs. (Running time 18 min. on 800-ft. reel.)

We shall be pleased to loan these films to agricultural colleges, experiment stations, county agents, vocational teachers, responsible farm organizations, and members of the fertilizer trade.

OTHER 16MM. COLOR FILMS AVAILABLE FOR TERRITORIES INDICATED

Potash in Southern Agriculture (South)
In the Clover (Northeast)
Bringing Citrus Quality to Market (West)
Machine Placement of Fertilizer (West)
Ladino Clover Pastures (West)
Potash from Soil to Plant (West)
Potash Deficiency in Grapes and Prunes (West)
New Soils from Old (Midwest)
Potash Production in America (All)
Save That Soil (All)

IMPORTANT

Requests should be made *well in advance* and should include information as to group before which the film is to be shown, date of exhibition (alternative dates if possible), and period of time of loan.

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